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MODERN Machine Shop

VOLUME 15 • NUMBER 9
FEBRUARY, 1943

Contents

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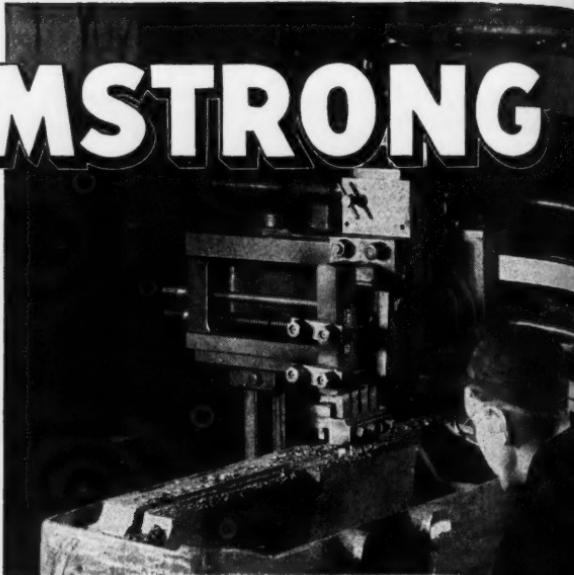
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MODERN Machine Shop

FEBRUARY, 1943

VOL. 15, No. 9

CINCINNATI, OHIO

We Present ---

— as the feature in this issue — the first article of a new series on the design of automatic screw machine tools. The author — Mr. Noel Brindle — has for the past 12 years designed the cams, tools, and attachments used in automatic screw machine work at the Kearny Works of the Western Electric Company, and sometime previously spent 5 years in automatic screw machine work plus months in the designing department at the Brown & Sharpe plant in Providence, Rhode Island. Mr. Brindle "knows his stuff" on automatic screw machine tools and we suggest that those who are interested save all copies from now on containing this series.

— on page 122 — an interesting picture-story presenting some of the interesting operations involved in the machining of parts and building of marine turbines at the General Electric Works. Inasmuch as turbines are used not only in merchant ships but in many types of fighting craft, particular significance attaches to this story.

— a new article on employee training for war manufacturing as this training program is carried on at the Briggs Manufacturing Company's plants in Detroit. Beginning on page 138, this article will be unusually interesting to those responsible for training new employees for the present emergency.

— on page 154 — a description of the way Westinghouse goes about building gun mounts for use on our battle wagons and other Naval combat units. We hope to have more details on these units in a subsequent issue.

— beginning on page 162 — the story of a new development by the engineers of the Vega Aircraft Corporation as a result of which drop hammer and press operations are speeded up considerably. And in these days when the fate of the nation depends upon production, such developments as this, making possible increased production and better quality, multiply in value.

— on page 178 — a discussion of that ever important subject — safety in the machine shop. On the production lines, as elsewhere, there is safety in numbers, because production lines today mean safety for the nation and every worker who becomes a casualty reduces our possibilities of winning just that much. The safety devices presented in this article are worth studying.

— a welding award study on a gun carriage, showing how efficiency was increased and costs were cut by the use of the modern magic wand — the welding torch. You will find this article on page 190.

— the usual "Ideas from Readers" and other departments.



Tooling for the Automatic Screw Machine, I

The first of a series of articles on the design of screw machine tools. In this article the author presents a simple method for screw machine planning.

By NOEL BRINDLE

WHEN it is necessary to obtain a definite time (seconds) for the making of a part in an automatic screw machine, the engineer who is not thoroughly familiar with the subject may find it difficult, with the result that considerable unnecessary time may be spent on the problem. When his calculations are finished it may be a matter of question whether the job has been planned in the best possible manner and whether everything has been taken into consideration.

There are many factors to be considered in planning for screw machine

involved. He should be thoroughly acquainted with the different types of screw machines, both single-spindle and multi-spindle, and must know their capacities. He must also know what kind of work each machine is qualified to handle.

The engineer should also be familiar with the proper surface speeds to be used for various materials and the feeds to be used for each cutting operation.

Most important of all, he must be able to arrange the sequence of operations to the best possible advantage, overlapping operations where it is ever possible, but allowing clearance time between three or more tools and cross slide tools when necessary. To properly prepare the order of operations it is necessary that the planner be familiar with all the standard tools used for each machine, so that the tool best suited for a particular operation may be chosen.

From the foregoing, it is apparent that a great many items have to be considered for each job. Even though an engineer is familiar with the subject of screw machines, it is sometimes likely that

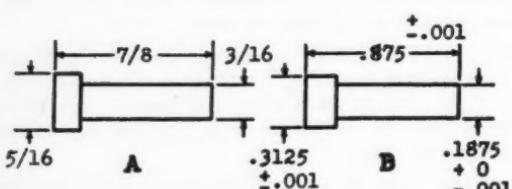


Fig. 1—Drawing of Simple Screw Machine Product. Limits on Part "B" Increase the Time Required from 3 Seconds to 10 Seconds

work. If the screw machine department consists of a large number of various types and sizes of automatics, the problem becomes even more

TABLE I
Order of Procedure (Part 1)

1. **Careful Study of Piece Part**
(A) Limits
(B) Notes
 2. **Choose Style of Machine**
B & S Cutting Off, Turret Forming, Old Style Regular, H.S. 36-spindle speed, and Threading Machine.
Davenport, Acme, Cone, etc.
 3. **Choose Size of Machine and Check Capacity**
(A) Size stock that can be handled
(B) Turning capacity
(C) Amount machine will feed at one movement
 4. **Surface Speeds**
 5. **Accurate Chuck Sketch**
 6. **Order of Operations**
(A) Overlap turret and cross-slide operations, if possible.
(B) Provide clearance time, if necessary.
 7. **Tools Required**
- Order of Procedure (Part 2)**
8. **Determine Throws**
 9. **Choose Correct Feeds**
 10. **Determine Cutting Revolutions**
 11. **Determine Time for All Items other than Cutting Operations**
 12. **Determine Time in Seconds**
(A) B & S Automatics
(B) Multi-spindle Automatics

Careful Study of Piece Part

(A) Limits

Consider all limits because they usually have an influence on the method to be used. An illustration of a part to be made from screw stock is shown in Fig. 1.

At first glance it might appear that these parts are practically the same. However, because of the limits shown at "B," the time to make this part would amount to 10 seconds, while the part "A" could be made in 3 seconds. The turning operation on part "A" would be done in one cut with a roller back-rest box tool, but the turning operation on part "B"

Order of Procedure (Part 1)

Table I presents the "Order of Procedure," listing the various items which should be considered in every screw machine job. A description for each item follows.

would require a roughing operation followed by a finishing operation in order to obtain the close limit required. A balance turning tool would be used for the roughing cut, followed by a finishing cut with a 45 deg. box tool.

Because of the limit on the over-

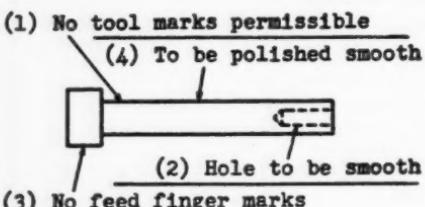


Fig. 2—Specifications as to Finish Make a Difference in the Tooling

all length, it would be necessary to face the end of the part "B" with a blade held in a box pointing tool with a bushing ahead of the blade, whereas the "A" part would not require this additional operation. The limits on the outside diameter of the "B" part are such that commercial stock varying plus 0; minus 0.002 could not be used. This would be below the low limit on part "B" and it would be necessary to use 21/64 diameter rod and turn it down to 0.3125 plus or minus 0.001 inch.

(B) Notes

Let us assume that a piece is to be finished in accordance with the notations on the drawing Fig. 2. Note (1) will require that the tool be turned on and off at the same slow feed. Note (2) will call for a reaming operation even though the size of hole is not important. For Note (3) it will be required to use a larger diameter stock and turn it down, or use highly polished feed fingers. Note (4) indicates a burnishing operation.

If Note (5) on the drawing Fig. 3 were not shown, the stock would be fed out and the diameter turned, then

the stock would be fed out a second time, after which the forming and cutting off would take place. However, the formed and turned diameters would not be concentric. To meet the requirements of Note (5) the stock would be fed out followed by the turning, forming, and cutting operations. However, a larger machine would be required.

Style of Machine

Assuming that a certain plant has a large variety of single and multi-spindle machines, it becomes quite a problem for the tool engineer to choose the most suitable machine for a certain job unless he is quite familiar with all the screw machines in that plant. It is important, for instance, that a form and cut-off job on a part with only one turret operation should be placed in a B & S cutting off machine, and if a part requires several turret operations but no threading or tapping, that a turret forming machine be used. When tapping or threading is required on steel or other such material, an old style machine should be used if it is available.

For all parts which include threads

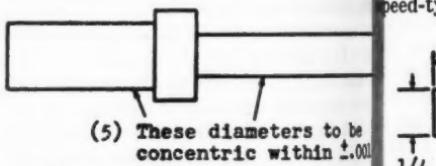


Fig. 3—Note (5) on the above Drawing Makes a Difference in the Sizes of Machines that can be Used for this Job

and tapping operations on brass or aluminum, the 36-spindle machine should be used. For an ordinary screw up to $\frac{1}{8}$ inch diameter, which capacity could be made by the form and cut-off method, a B & S threading machine would be chosen.

On very large requirements, where the limits of accuracy are not too

a second piece, a multi-spindle machine should be specified; the Davenport for jobs up to $\frac{1}{2}$ -inch diameter and the Acme, $\frac{3}{4}$ -inch diameter. To machine larger diameters, it is usually not economical to set up a job in a multi-spindle machine unless the requirements are quite large, as the set-up time is the determining factor.

Size of Machine

After the style of machine has been decided upon, a size should be chosen which will accommodate the size of stock which will be used. The machine must also have a turning capacity sufficient for turning or drilling the longest length on the part, and should have a feeding movement which accommodates the total length of the part.

If a B & S style of automatic screw machine were to be used to make, from hard brass, the part indicated in Fig. 4, the size of machine would be determined by referring to the capacity chart for the style of machine chosen (refer to pages 256 to 261 of the B & S Screw Machine Book) and checking for a size of machine which would handle $\frac{1}{4}$ -diameter stock. Assuming that the B & S 36-spindle speed-type machine were to be used,

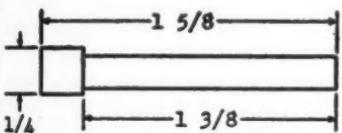


Fig. 4—Here the Length of the Turned Part Determines the Size of Machine to be Used

it would be found that an 00 size machine would be correct.

However, in checking the turning capacity of this machine, it would be found that the $\frac{3}{4}$ -inch length of turning capacity would be insufficient.

Even the $1\frac{1}{4}$ -inch turning capacity, which the OG size machine would be too short, so the No. 2 size machine

would be chosen. In checking the amount of stock that can be fed in one movement, the $2\frac{1}{2}$ -inch capacity available on the No. 2 machine would be ample for this piece.

Surface Speeds

When machining brass or aluminum, it is advantageous to use the

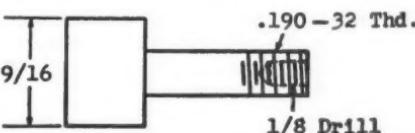


Fig. 5—Drawing of Typical Screw Machine Product. Selection of the Machine to be Used will be Based upon the Surface Speed to be Used on the Largest Diameter

fastest speed available on the machine. For mild or tool steel, phosphor bronze, nickel silver, and other like materials, the question of surface speed must be considered. This applies to all the cutting operations.

	A	B	C	D	E
Form, Cut Off, and Turn...150		973	960	149	
Thread	40	790	418	21	
Drill	75	2400	960	32	

For a thorough method of checking the surface speeds to machine the mild steel part shown in Fig. 5, the following steps are suggested. (See chart):

- A—List all the cutting operations.
(No special sequence required.)
 - B—Choose the recommended surface speeds for the various operations based on the material specified. (Refer to page 248 of B & S Handbook.)
 - C—Apply these surface speeds to the various diameters and find the resultant spindle speeds. (Refer to page 249.)
- Note: For the forming, turning, and cutting off operations the surface speed chosen will be based on the $\frac{1}{4}$ inch diameter. The surface speed for the drill-

ing would be for a $\frac{1}{8}$ inch diameter. For the 0.190 inch thread diameter, the surface speed recommended for that operation would show the spindle speed for threading.

D—Refer to the chart showing the available spindle speeds on the machine chosen, and choose the speed or speeds which are nearest to the spindle speeds desired. (Refer to pages 222 to 247 in B & S Handbook.)

E—Consider each cutting operation and check the spindle speed chosen for each one, and consider the particular diameter and find the new surface speed.

Accurate Chuck Sketch

The workpiece is drawn to full scale, after which the cut-off tool is shown in its advanced position. It is then usually possible to draw the chuck line, approximately $1/32$ inch from the cut-off tool. If there is a turning operation, it is advisable to show a cut-off tool with an after-cut which will chamfer the front end of

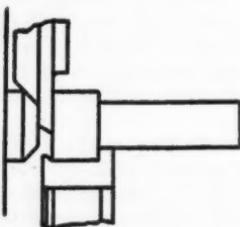


Fig. 6—An Accurate Full-Size Layout of the Work and Chuck Enables the Tool Designer to Determine Whether Alterations will be Required on the Lead Cam

the next piece. This allows the box tool blade to advance sufficiently to bring the box tool back rests in contact with the work before the full depth of the cut is taken. A typical chuck sketch is shown in Fig. 6.

The most important reason why an

accurate chuck sketch is required to allow the tool designer to determine whether any cut-downs on lead cam will be required. This sometimes necessary on Brown & Sharpe automatics when the body of the turret tool is long, or the cutting operation takes place near the end of a long workpiece. When the lead roll is on top of the lobe, there

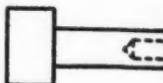


Fig. 7—Time is Reduced on the Piece Shown Here by Overlapping the Cross Slide Turret Tool Operations

definite distance between the chuck and the turret. If this distance is not sufficient to place a cutting tool at the end of its advance, a cut-down on the lead cam will bring the tool back the required amount.

Order of Operations

To satisfactorily consider this in the "Order of Procedure" requires a great deal of resourcefulness. The planner must have a complete understanding of the various standards available for the machine. He should know when to use the most desirable tool for a particular job. Most important of all, he must know how to arrange the operations in such a manner that the cross slide tools may be cutting while the turret tool is functioning, which is usually referred to as overlapping of the cross slide and turret tools. Another important item to consider is the clearance time required between large turret tools and the cross slide tools.

An example showing the importance of overlapping operations in providing clearance is shown in Fig. 7.

Listed below is a sequence of operations as they might be performed incorrectly and correctly, with advantages and disadvantages.

Incorrect Order of Operations

Feed to Turret Stop

I.T.

Center

I.T.

Drill

I.T.

Turn

Clearance

Cut Off

Disadvantages

No overlaps possible. Clearance time necessary.

Correct Order of Operations

Feed to Turret Stop

I.T.

Turn

I.T.

Center

I.T.

Drill

Cut Off

Advantages

Part of cutting off overlapped while drilling. No clearance time required.

The problem presented in the drawing Fig. 8 will further illustrate the case.

Incorrect Order of Operations

Feed to Turret Stop

I.T.

Turn

I.T.

Form

I.T.

Thread

Cut Off

Disadvantages

The indexing time allowed between the turning and forming and the forming and threading would not be sufficient to allow one tool to drop back before the other tool commenced to advance from its back position. Clearance time would also be necessary between the threading operation and cutting off operation.

Correct Order of Operations

Feed to Turret Stop

I.T.

Turn

Clear

Form

Clear

Thread

Clear

Cut Off

Advantages

The necessary clearance time has been allowed between the large turning tool and the form tool. After the forming is completed, another clearance time is provided. A third clearance time is shown to allow the threading tool to withdraw and for the cut-off tool to advance into cutting position.

On multi-spindle machines the problem of overlaps and clearances is not so important. On these machines the combining of various cutting tools

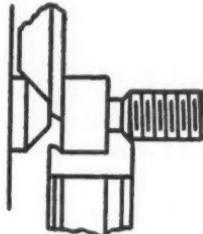
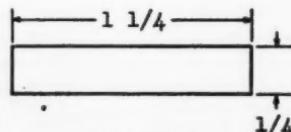
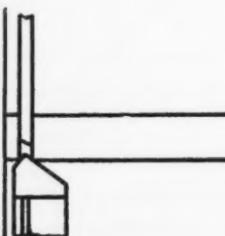


Fig. 8—On Such a Workpiece as This, the Minimum Production Time is Obtained by a Combination of Good Tool Design with Correct Operation Layout

in the different stations must be considered. There are some operations which can be performed only in a certain position.

On some multi-spindle machines the threading or tapping can only be done in the third position or the accelerated reaming or recessing may be performed in the fourth position.

TABLE II



$\frac{1}{4}$ Dia. Mild Stl.

B & S No. 00 CUT-OFF MACH.

2,400 R.P.M.

157 Surface Speed

3 Seconds to Make One Part

Order of Operations	Throw	Feed	Revs.	Hundredths
Feed Stock			24	—
Cut Off151	.0015	100	—
			124 (A)	

(Operations Overlapped)

Chamfer Dw.015	.0015	14	—
------------------	------	-------	----	---

(A) 124 equals total revolutions to make one piece. Refer B & S book, page 296, under 2,400 r.p.m. column. Nearest available revolutions equal 120 or 3 seconds.

On the Davenport machine, for example, the cutting off can be performed only in the fifth position. From the above it can be seen that a thorough knowledge of the machine and the tools is necessary.

Tools

Considerable care should be exercised to choose the correct tools for each job. As an illustration, a turning operation on the Brown & Sharpe automatic could be performed with a balance turning tool for a roughing operation, a 45 deg. box tool for a finishing cut, or a roller back rest tool for reducing from a large diameter to a small diameter. It would also be possible to turn a diameter by using a box pointing tool with a bushing to guide the work located ahead of the blade, or a hollow mill with three teeth for use on long, slender work.

For a long turning operation behind a shoulder, it would be possible to use a blade held in a swing tool actuated by a gear located on the front cross slide. From the above it can be seen that the plant engineer must have a thorough understanding of the characteristics of each standard tool effectively choosing the most suitable type for each job.

It is also important to consider the capacity of each tool as regards the

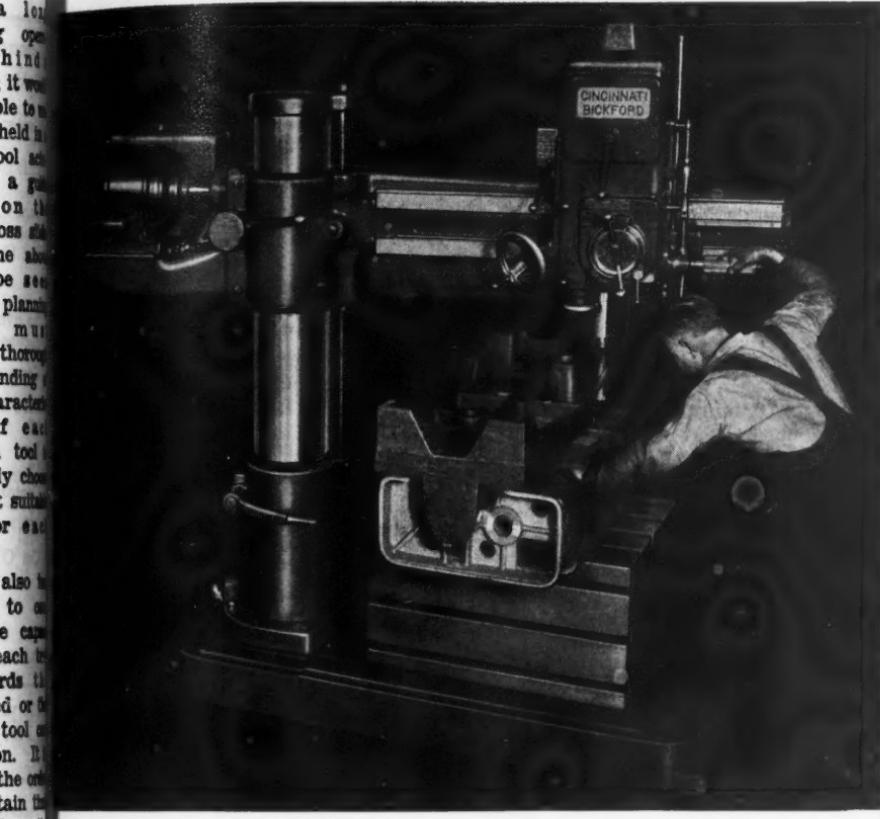
diameter that can be handled or the maximum length that the tool can travel on a turning operation. It is necessary to check through the order of operations and make certain that all tools necessary to produce the piece have been provided, and the stock tools and general-use tools have been used whenever possible.

Order of Procedure (Part 2)

The remaining items to be considered are all of a category which might be classified as routine steps. Assuming that the order of operations has been listed on a layout sheet, with the overlapped operations properly noted, the next step is to provide three more columns representing throws, feeds, and cutting revolutions. Refer to Table II for sample cam operation sheet.

Determine Throws

The throw is the amount of time



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necessary to complete each operation. If a turned portion is 1.000 inch long, the throw would be 1.000 plus an approach of $0.010 = 1.010$ inch. Each tool is brought forward into cutting position at a fast rate of speed, therefore it is advisable to slow down to the cutting feed just before the cutting tool contacts the work to avoid the possibility of the tool bumping into the work at the fast rate of travel. The approach is only necessary on the Brown & Sharpe machines. On the multi-spindle machines this approach is automatically provided for in the machine.

A few of the more common cutting operations are listed below, with the method to be used to determine the throw.

Operation	Method of Determining Throw
Cut Off	0.005 approach + $\frac{1}{2}$ dia. of part + depth of heel on cut off tool + 0.005 for heel to pass center of part.
Form	Diameter of stock minus smallest diameter formed divided by 2 plus 0.005 for approach.
Center	0.010 for each $1/32$ of hole diameter plus 0.010 approach.
Drill (when hole goes thru part)	0.010 approach plus length of part plus width of cut off tool.
Ream	0.010 approach plus length of part plus 0.040 .
Turn	0.010 approach plus length to be turned.

Determine Feeds

The amount of advance on each cutting tool for each revolution of the spindle is based on several factors. On a turning operation it is the depth of the cut. On a forming operation the width to be formed determines the feed, and for a drilling operation the diameter of the hole to be drilled determines the feed per revolution.

The material to be machined also

controls this item. A forming tool on a brass part, for example, can be fed forward probably four times as fast as though a tool steel part were being machined. An excellent guide for use in choosing the correct feed per revolution for each operation, based on the material to be machined, will be found on page 248 of the Brown & Sharpe publication "Construction and Use of Automatic Screw Machines."

Determine Cutting Revolutions

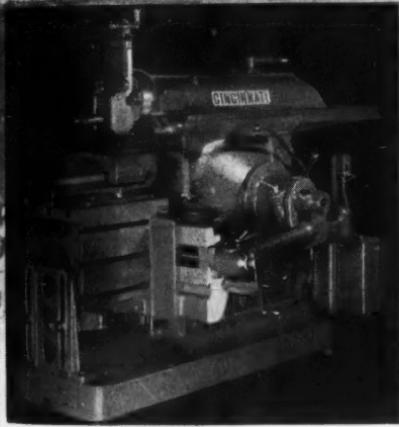
The throw divided by the feed equals the number of cutting revolutions required. On Brown & Sharpe automatics it is customary to add four extra revolutions on all forming and centering operations to allow the tool to dwell for a few revolutions after the tool has reached its maximum travel.

Determine Time for All Items Other Than Cutting Operations

After the columns for the throw feeds, and cutting revolutions have been filled, the time for idle movements such as feeding of the stock, indexing of the turret, and clearance time between turret tools and cross slide tools should be determined. For the majority of jobs, the time to feed stock and index turret can be taken from the various charts in the B & S book. Directly below each of the figures for the different spindle speeds will be found a figure which represents the number of revolutions required for the feeding and indexing. On slow jobs that take over 35 seconds this number is not sufficient, in which case a reference to page 252 of the B & S book will give the number of hundredths required for these operations.

Assuming that a part is being made on an OG high speed 36-spindle speed machine, at a spindle speed of 4,150 revolutions per minute, a reference to page 280 will show that

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revolutions are required for indexing and feeding. As this is the actual figure required, it is advisable to add four extra revolutions in case the machine is worn.

Under the column for revolutions, the time for feeding and indexing should be entered.

Determine Time in Seconds (Brown & Sharpe Automatics)

If clearance time between cross slide tools and standard turret tools is required, page 253 of the B & S book will be of assistance in determining the hundredths of cam surface required.

All the cutting revolutions are now added up, omitting any revolutions that are overlapped. Assuming that the total equals 300 revolutions and that 25 hundredths are required for clearance time, this would mean that 300 revolutions equalled 75 hundredths; therefore, 100 hundredths would equal 400 revolutions.

Again referring to page 280 and glancing down the column headed by the revolutions of the spindle, which is 4,150, it is found that the nearest number to 400 revolutions is 392 revolutions, which require $5\frac{1}{3}$ seconds to make one part.

Determine Time in Seconds (Multi-Spindle Automatics)

On this type of machine the operation which requires the largest number of cutting revolutions, added to the time required to rotate the spindle carrier from one station to another, represents the time to make one part. When the operation requiring the largest number of cutting revolutions is found, it is desirable to try to decrease this number.

For instance, if a forming operation requires the most revolutions, it might be possible to split the forming between two or even three cross slides. If the cutting off operation decides the time per part and there

are no heavy succeeding tool operations, this operation could be done from two cross slides instead of one. On a long drilling job where the drilling time determines the time per part, it might be advisable to use a revolving drilling attachment to reduce the number of effective cutting revolutions.

Assuming that 120 effective revolutions are required and the spindle speed is 2,400 r.p.m., the problem would be solved as follows:

$$\frac{120 \times 60}{2,400} = 3 \text{ seconds}$$

To this 3 seconds would be added the time in seconds required to rotate the spindle carrier from one position to another. This information is given in the booklets furnished by the manufacturers of multi-spindle machines.

Automotive Plants Turn In Their Scrap

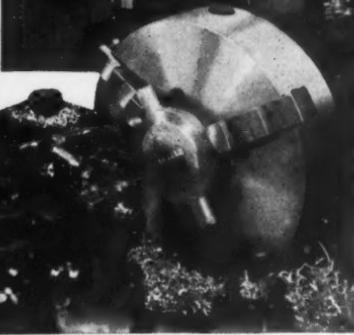
Enough metal scrap to build more than 20,000 medium tanks has been recovered in automotive factories in the first six months of the industry's salvage campaign, the latest figures showing that in six months the industry collected 1,433,856,315 pounds of scrap.

Of this total, it is disclosed, iron and steel accounted for 1,349,931,520 pounds, the remainder being non-ferrous metals. While cuttings and turnings made up the bulk of the scrap, a total of 383,662 pounds came from such sources as production scrap as discarded tools, machinery, and other equipment that was unfit for war work.

In these six months of continuous house-cleaning in the industry, automotive companies authorized their vendors to release more than 9,000 tons of old equipment to the nation's scrap piles. Women, authorizing the scrapping of aluminum molds, one company released enough high grade aluminum to fill 5½ rail freight cars. Another company, having converted its plants from automobile to arms production, reported that its scrapping of such dormant equipment as conveyors, machinery, pipes, exhaust stacks, steel rails, and so on had netted 5,000,000 pounds of non-productive scrap in October alone.



With Their Help We'll Win



These women, machining precision parts on South Bend Lathes in a vital war plant, are typical of thousands of women who are doing their part to win the battle of production.

With eager hearts and nimble fingers, thousands of American women are working shoulder with shoulder with men in vital war industries—replacing those who have left their machines to defend their country. And they are doing a fine job of filling men's shoes, for they know that the battle of production must be won to keep their men at the front supplied with the guns, planes, tanks, bullets, and thousands of other things an army must have to be victorious.

Women learn to operate South Bend Lathes in a surprisingly short time. Not that just any girl can become an expert machinist or toolmaker over night. But on certain classes of work—the kind of work you would expect a beginner to do—women are highly successful.

Quick to appreciate quality, women like South Bend Lathes. They like the fully enclosed design—the smooth op-

eration of conveniently placed controls and the dependable precision that enables them to turn out maximum production. And, most of all, they appreciate the ease of operation which reduces fatigue to a minimum and seemingly shortens the work-day by hours.

South Bend Engine Lathes and Toolroom Lathes are made in four sizes, 9" to 16" swings. South Bend Turret Lathes are available in three sizes. Write for information.

TRAINING HELPS

South Bend training helps—books, sound films, wall charts, and bulletins on the care and operation of a lathe—are available for training new operators. Write for a copy of Bulletin No. 21-C.



SOUTH BEND LATHE WORKS
SOUTH BEND, INDIANA

LATHE BUILDERS FOR 36 YEARS

Building Marine Turbines at General Electric

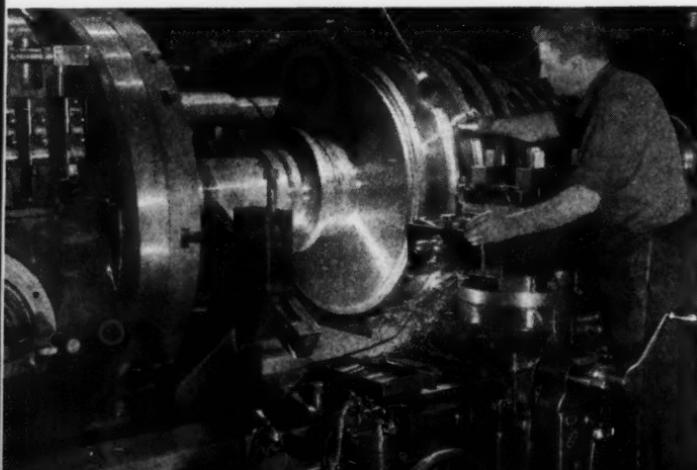
*A picture-story of some of the more interesting operations
in the fabrication of the modern power-units that
drive America's great ocean vessels*

By E. K. HENLEY
Federal and Marine Department
General Electric Company

THE heart of a modern ocean-going steamship is its driving or "propulsion" equipment, which, in these days, is usually a steam turbine. The turbine is the most efficient type of steam engine thus far developed, and operates upon the principle of directing a jet of steam at a succession of vanes arranged on the periphery of a rotating wheel similar to the arrangement of the buckets of a water wheel. To obtain

a clear picture of the operation of propulsion equipment, however, one of the best ways is to see it in process of manufacture before the equipment is installed in a ship.

In the modern turbine the steam traverses flowing curves, and the cross-sectional areas of the steam channels must be designed to increase in nearly exact proportion to the growing volume of steam as the steam expands to the exhaust pressure. As expansion takes place both within fixed and moving blades, however, the whole passage is one con-



Turning a Steam Turbine Rotor in a Large Lathe. The Discs are Turned to Close Limits of Accuracy and Finish in Order to Prevent Leakage of Steam

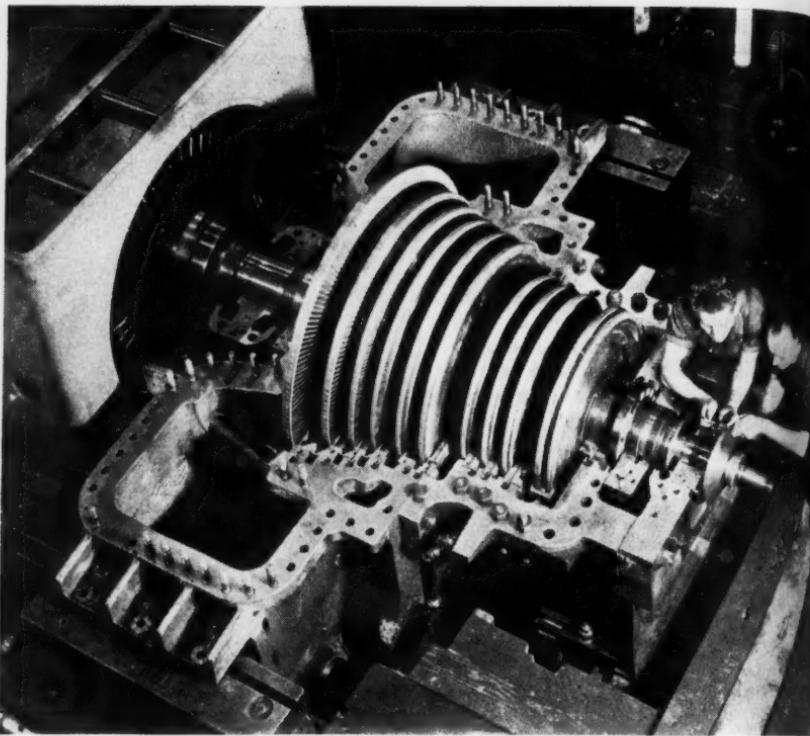
The Rotor is Finished All Over, and Every Dimension Must Check with the Design. Diameters, Thicknesses, and Radii are Measured with Micrometers and Other Measuring Instruments of the Finest Accuracy. This Workman is Using a Micrometer to Measure the Diameter of a Rotor Disc

tinuous nozzle; thus the clearances and workmanship must be of the finest in order to minimize leakage.

Involved in the manufacture of the steam turbine are all the special skills of metal working; casting, forging, welding, machining, and so on, for which the General Electric Company is admirably equipped. Propulsion sets of the geared-turbine and turbine-electric types are produced at General Electric for all types of ships. Illustrated in the following pages are some of the more important elements of propulsion equipments on the way to completion. From here on the pictures will tell the story.



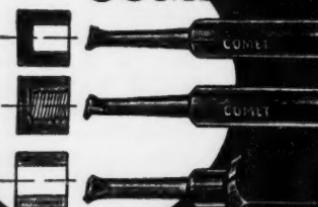
Rows of "Buckets" Like These, Dovetailed to the Rotor, Form the Moving Element Inside the Turbine. To Withstand the Terrific Punishment Involved in Harnessing the Energy of High-Pressure, High Temperature Steam, the Buckets are Forged or Milled from Bars of Specially-Alloyed Steel. The Mechanic Shown Here is Hand-Riveting Shroud Bands to the Bucket Wheels. The Completed Rotor will be Statistically and Dynamically Balanced to Assure Smooth Operation in Service



A Turbine is Built up of Thousands of Separate and Individual Parts, Fabricated into More than a Score of Sub-Assemblies. The Turbine Shown Here is Being Prepared for Test Prior to Shipment. The Top Half of the Casing is Yet to be Put On. In Service, the Turbine is Direct-Connected to a Generator which will Produce Power for a Propulsion Motor on an Electric Drive Ship

Buy a Bond today — it may save a ship tomorrow!

COMET Internal Threading and Boring Tools



For holes from $\frac{1}{8}$ " upwards 15 Different Sizes
The accurate thread angle is maintained through re-sharpening until tool is entirely worn down. One head—long cutting surface for regrinding.

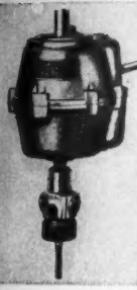
Write for complete data

COMET TOOL CO.
738 Broadway, New York, N.Y.

Ettco-Emrick HIGH-PRODUCTION DRILLING AND TAPPING EQUIPMENT

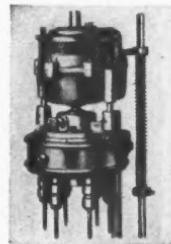
← TAPPING ATTACHMENTS →

Make a high-speed, sensitive tapper of any drill press. Quickly mounted without altering press. 7 sizes, for No. 0 to 1" taps. QUILL CLAMPS available to assure absolute rigidity. For full details, write for Bulletin No. 2.



MULTIPLE DRILLING AND TAPPING HEADS →

Highest production system for drilling and tapping. Makes it possible to drill or tap maximum number of holes simultaneously. Heads made entirely of standard parts. Can be used on drill press or tapping machine. QUILL CLAMP furnished with every head. For full details, write for Bulletin No. 3.



← VISIBLE GRIP TAP CHUCKS →

True centering on round and positive driving on square assured because operator can see grip when inserting tap. 5 sizes for No. 0 to 1" taps. Details in Bulletin No. 6. Collet type tap chucks available for No. 6 to $\frac{3}{8}$ " taps.



TAPPING MACHINE →

Has hair-trigger sensitive central friction clutch, automatic reverse and sensitively counterbalanced foot pedal. All the operator has to do is feed the work and step on the pedal. Unskilled operators can maintain production rates up to 12,000 holes per hour. For full details, write for Bulletin No. 4.



← KEYLESS DRILL CHUCKS →

Speed up drilling and save energy by eliminating the non-productive key-tightening operation. Also end slipping and re-tightening. Highest quality precision construction. Good for long, hard service. 5 sizes for No. 0 to $\frac{5}{8}$ " drills. Also stocked for portable drills. For full details, write for Bulletin No. 6.

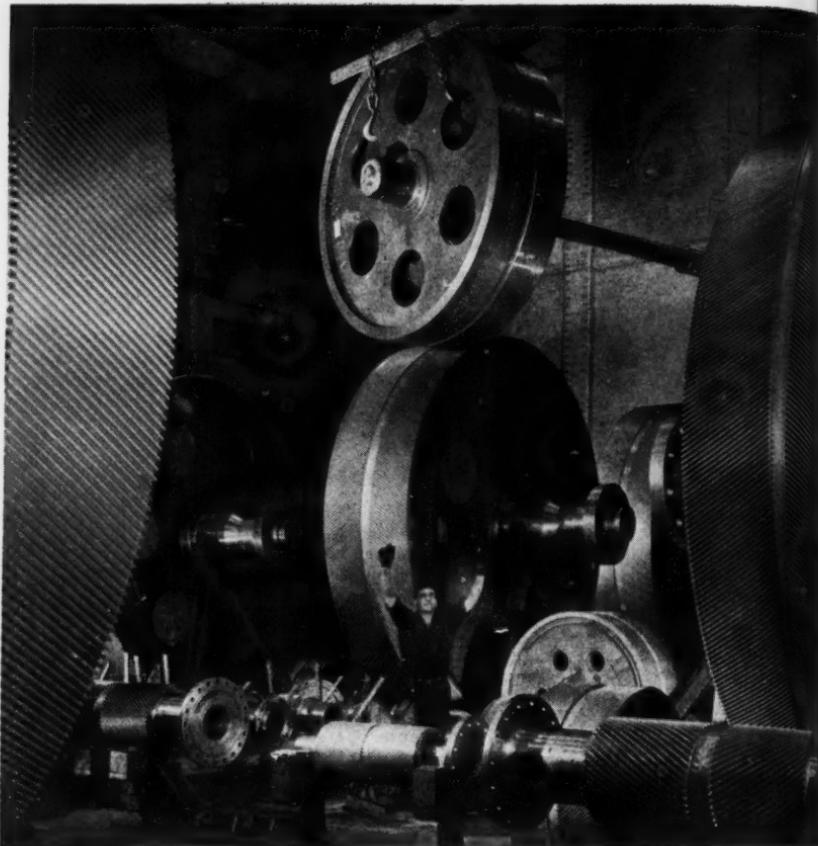


ETTCO TOOL CO.

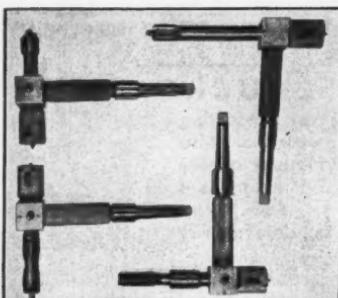
598 Johnson Ave., Brooklyn, N.Y.

Detroit

Chicago



Here are Some of the Different Types of Gears and Pinions Used to Translate the High Speed of the Propulsion Turbine into Slower, Efficient Propeller Speed. The Large Gears are the Low-Speed or "Bull" Gears. The Workman is Directing the Overhead Crane in Moving a High Speed Gear Blank to a Hobbing Machine



CONVERT DRILLS TO ANGLE TOOLS

INVINCIBLE Angle Tool Attachments make your portable drills universal for all operations . . . by converting them into angle tools in a few minutes.

Send us full details of your problems on tanks, gun mounts, turbine blading, torpedoes, ships, gun carriages, etc. Write, wire, or phone ATLANTIC 9571.

INVINCIBLE TOOL COMPANY
611 EMPIRE BLDG.
PITTSBURGH, PA.

Waste Warden Tells HOW TO GET LONGER SERVICE

from your
Welding and Cutting
Apparatus

TORCHES

1. Blow out hose before attaching torch.
2. Be sure the torch seat is clean.
3. Be sure packing nut is tight.
4. Also—don't use torch as a hammer. A torch built to withstand such abuse would be too heavy to handle.

TIPS

1. Clean tips with proper size standard cleaning drills only. Be sure to use a drill one size smaller than the orifice about to be cleaned. Makeshift wire cleaners enlarge tip openings and upset flame balance.
2. Store all tips in racks to prevent damage. Tips battered at seating end waste gas.

REGULATORS

1. Keep regulator seat dust free. Before attaching regulator clean outlet by cracking cylinder; clean gland by a short blast from cylinder.
2. Release regulator adjusting screw when changing cylinders. This prevents high pressure shocks to regulator seat.
3. Always open cylinder valve slowly when installing regulator. Repeated sudden cracking of cylinder into regulator promotes leakage.



DON'T JUNK DAMAGED APPARATUS

Today regulators, torches and tips are hard to replace. Good maintenance practices will help you get longer service and better performance from your gas welding and cutting apparatus.

But if a torch, tip, or regulator is damaged—don't junk it. Instead send it to an Airco Apparatus Repair shop where factory-trained repairmen will make it work like new. This nationwide repair service is available through your nearest Airco office.

Air Reduction

General Offices:

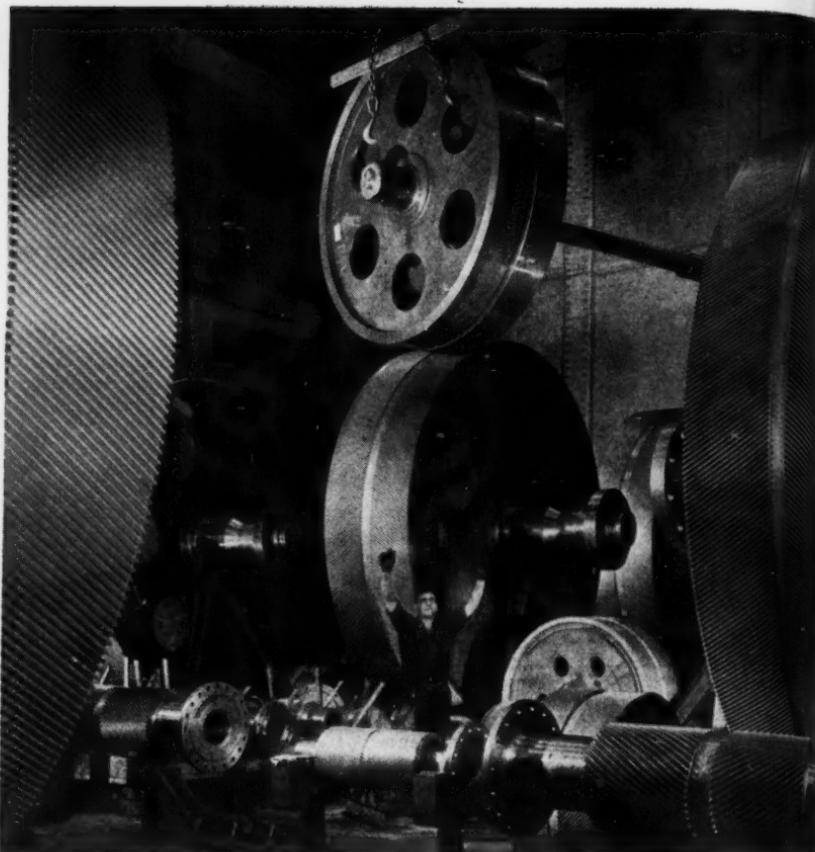
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IN TEXAS

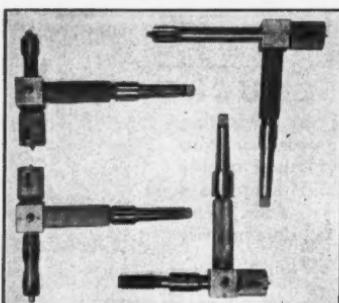
MAGNOLIA - AIRCO GAS PRODUCTS CO.



IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*



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Air Reduction

General Office:

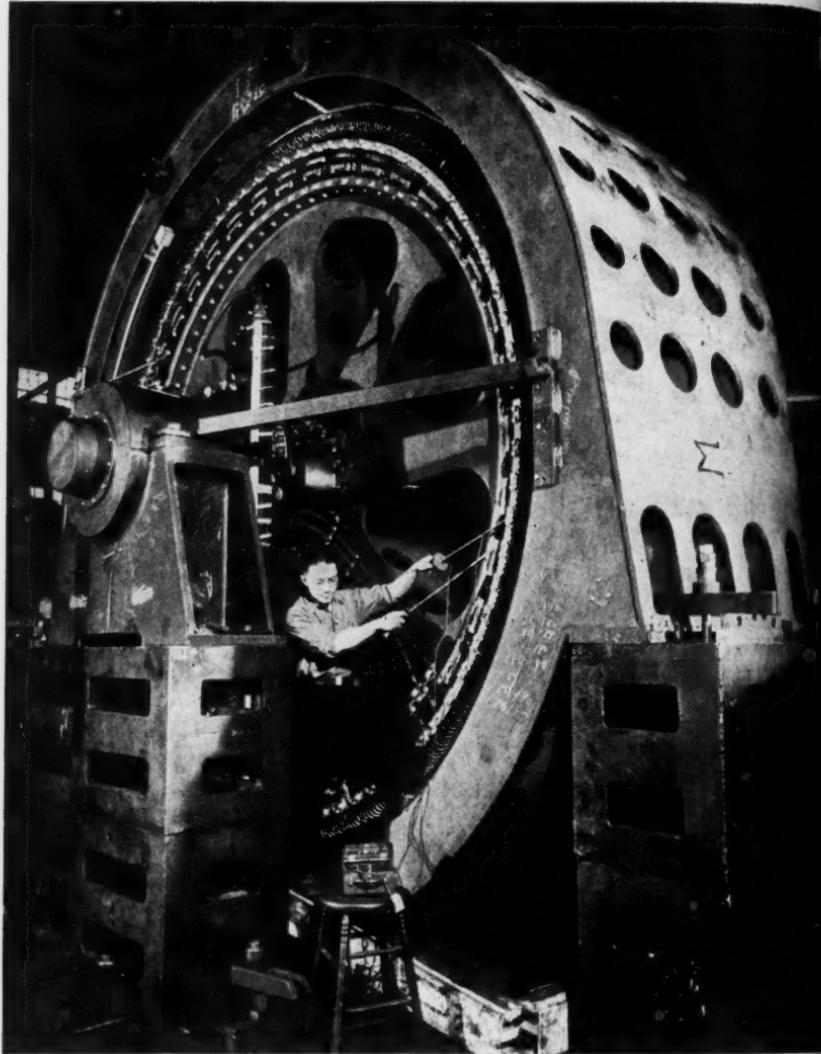
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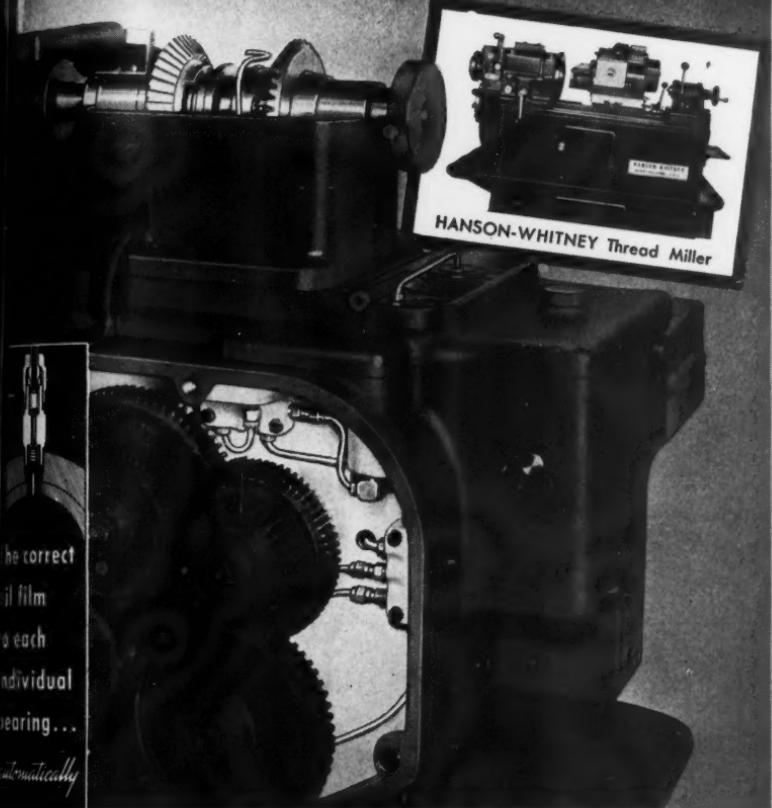
IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*



Completed and Nearly Ready for Shipment, This 6,000-Horse-Power Propulsion Motor for an Electric-Drive Ship is Being Tested by 23-Year-Old Engineer Francis Li. Born in Hong Kong, Li Came to the United States in 1937, Earned a B.S. in Electric Engineering in 1941, and Entered G. E. as a Student Engineer. He is Shown Measuring Voltage Drop across each Pole to Assure that no Shorts Exist in the Wiring Turns

Liberty at any price is cheaper than slavery. Buy Victory Bonds.

EXACTING demands

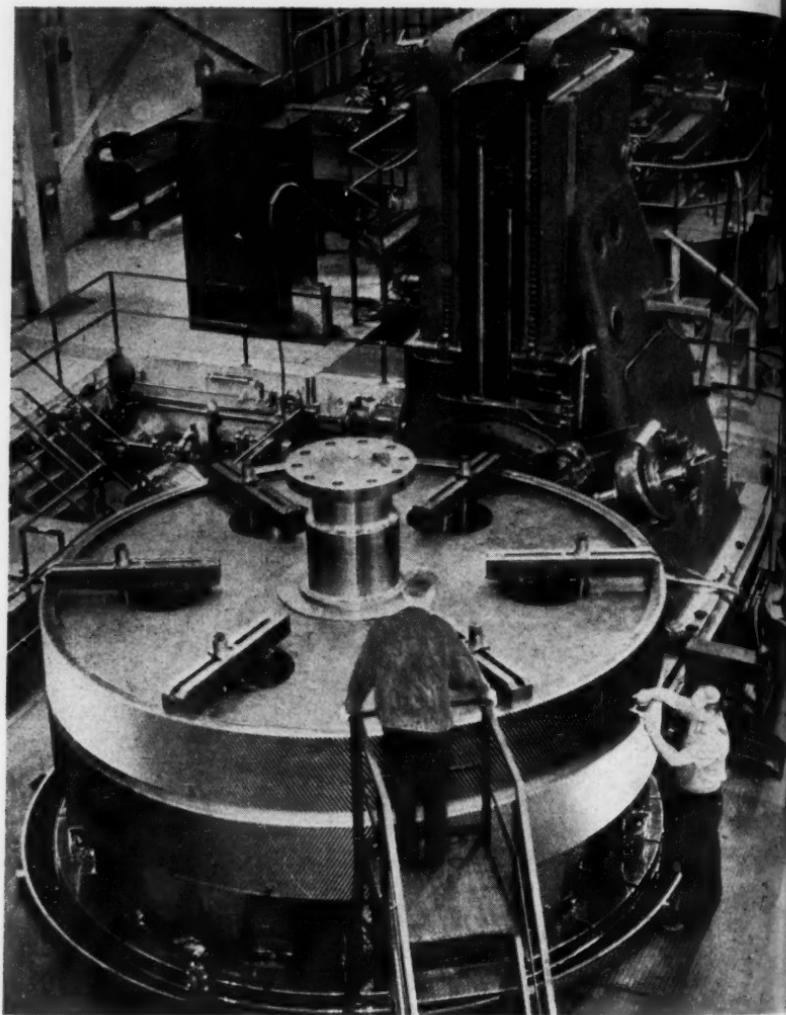


...be correct
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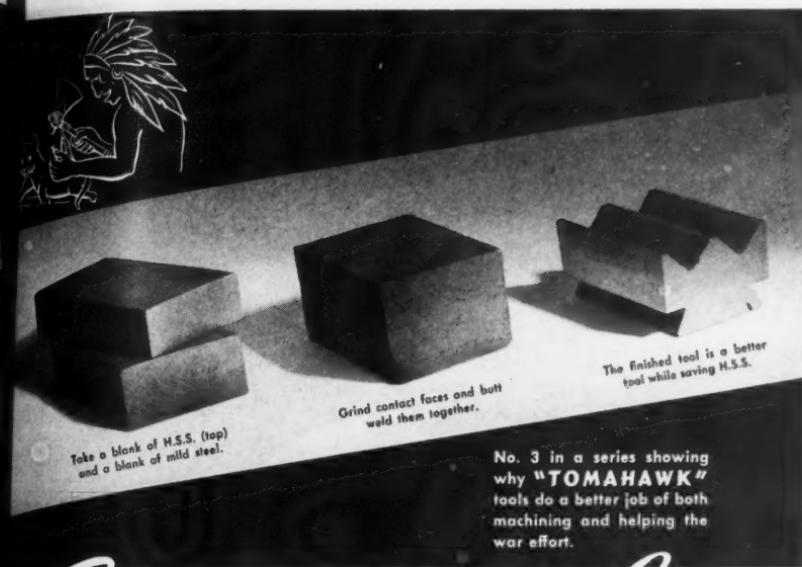
- Production machines developed for highest quality of performance — unfailing precision . . . greater refinement and closer limits in product . . . versatility, speed, quick set-up — naturally take advantage of Bijur automatic, metered lubrication. And the user reaps the benefit of economy as well as quality and quantity in production. Safeguarded machine accuracy — with spoilage and costly maintenance eliminated!

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AUTOMATICALLY *Correct* LUBRICATION



Large Hobbing Machines Like This One will Cut Teeth in Bull Gears up to 35 Tons 200-Inch Diameter to a Tolerance of 0.0003 Inch. Rough- and Finish-Cutting on These Gears Requires 285 Hours. Cutters are Changed Between the Rough and Finishing Cuts, and the Clamps are Loosened so that all Spring is Eliminated. A light Finish can be Taken with the Piece Lightly Clamped, thus securing Maximum Accuracy. Finish Cuts Must be Made without Interruption, and Auxiliary Power as Well as Duplicate Lubricating System is Always Ready for Emergency Use. When Finishing the Gear is Gaged with a Micrometer Gage that is Cooled or Warmed, if Necessary, to the Exact Temperature of the Work



No. 3 in a series showing
why "TOMAHAWK"
tools do a better job of both
machining and helping the
war effort.

Putting skin on a cator on a tool.....

Just as there is more than one way to skin a cat, so there is more than one way to save critical tungsten and still make better tools.

There is a total of less than 2 per cent of critical tungsten in the complete **TOMAHAWK** tool type* shown at the right. The reason: it has been fabricated by electrically welding High Speed Steel to mild steel, prior to machining, heat-treating, and grinding. The net saving of tungsten usually runs 50 to 75% as compared with tools of solid H. S. S.

The **TOMAHAWK** tool shown is 'hard' where hardness is required (at the cutting edges), and is 'tough' where toughness is important (at the dovetail).

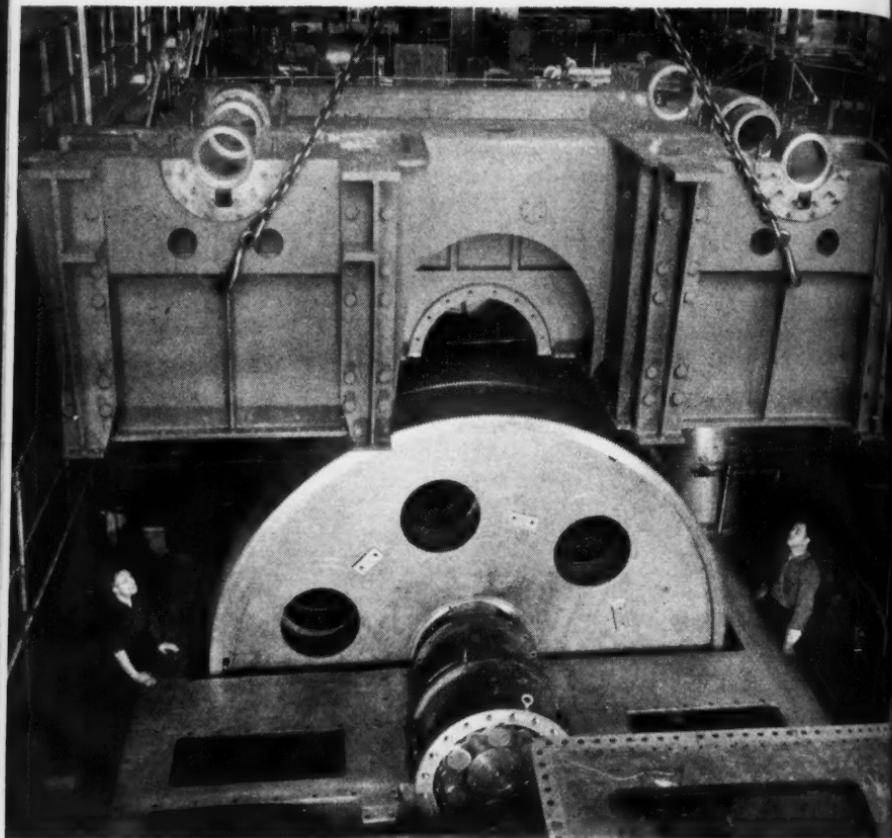
Perfection of welding and heat-treating techniques have been carried to such a point today that failures of such tools at the weld are virtually unknown. Thousands of electrically welded composite steel **TOMAHAWK** tools are now in use in war production industries.

*Genesee produces a complete line of cutting tools, including H.S.S., carbides, etc.
Send for "streamlined" catalog No. GT-42-Am.

GENESEE TOOL COMPANY
FENTON, MICHIGAN



35 Tom
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Intermediate Section of a Gear Casing Being Lowered into Position for a Shop. Bearing Seats at the Top of Each Side of the Section Have Been Bored by the Same Machine and From the Same End to Assure Perfect Shaft Alignment. The Three Metal Sections Which Make Up the Complete Casing are Annealed Before Machining

Relieving Any Stresses that May have Been Set Up by the Welding Operation

The New Prince Lathe Grinding Attachment

For Economical, Low Cost,
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Easy to set up, simple to use, and wide range for cylindrical grinding. Can be used on any standard make of lathe. Capacity varies with size of lathe.



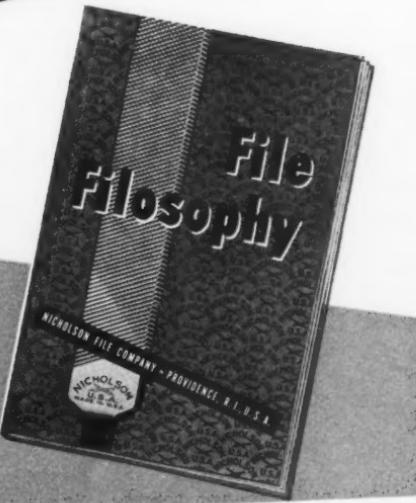
The PRINCE GRINDER may be the solution to your grinding problem; act now, write to

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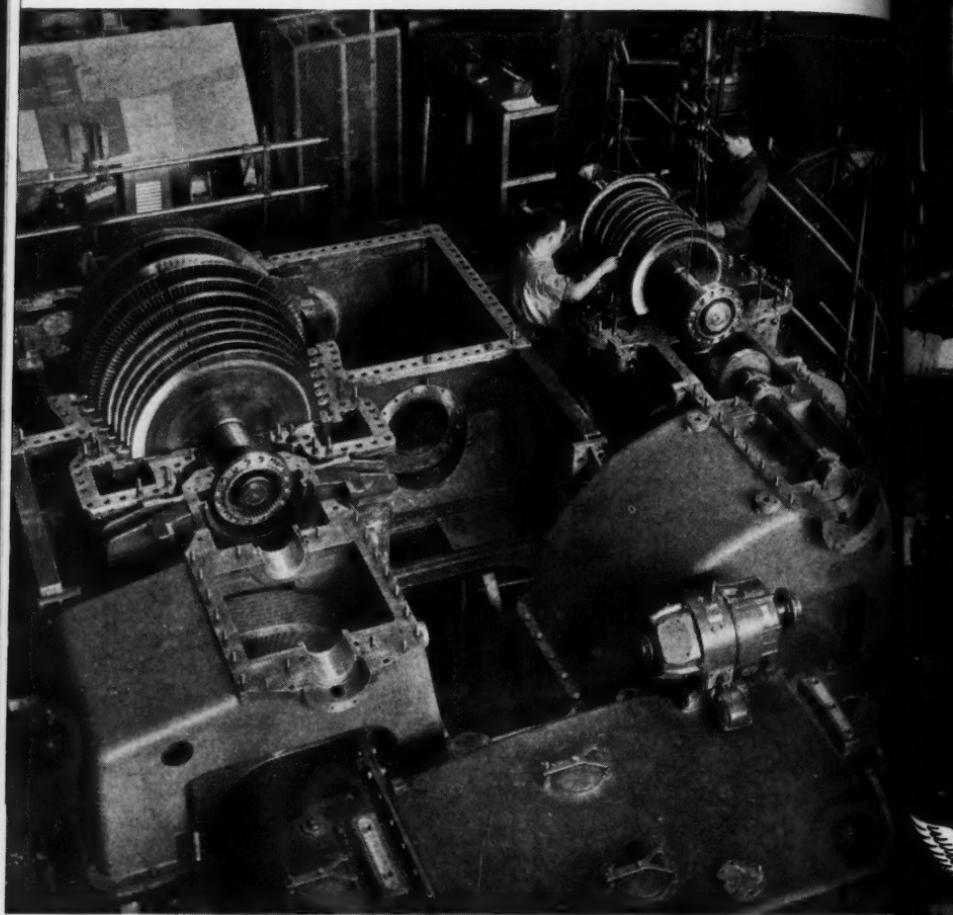
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AID to America's war effort! A help to industrial men and management! A Nicholson contribution toward greater production speed and efficiency, greater conservation of time and materials—longer file life!

"FILE FILOSOPHY" reflects the experience of 79 years of filing research, file designing and file manufacture. It contains the best portions of fifteen editions of a previous file treatise printed under the same title. To it has been added much of the contents of a supplemental Nicholson book, "A File for Every Purpose." Still more has been added to cover today's advances in shop practices.

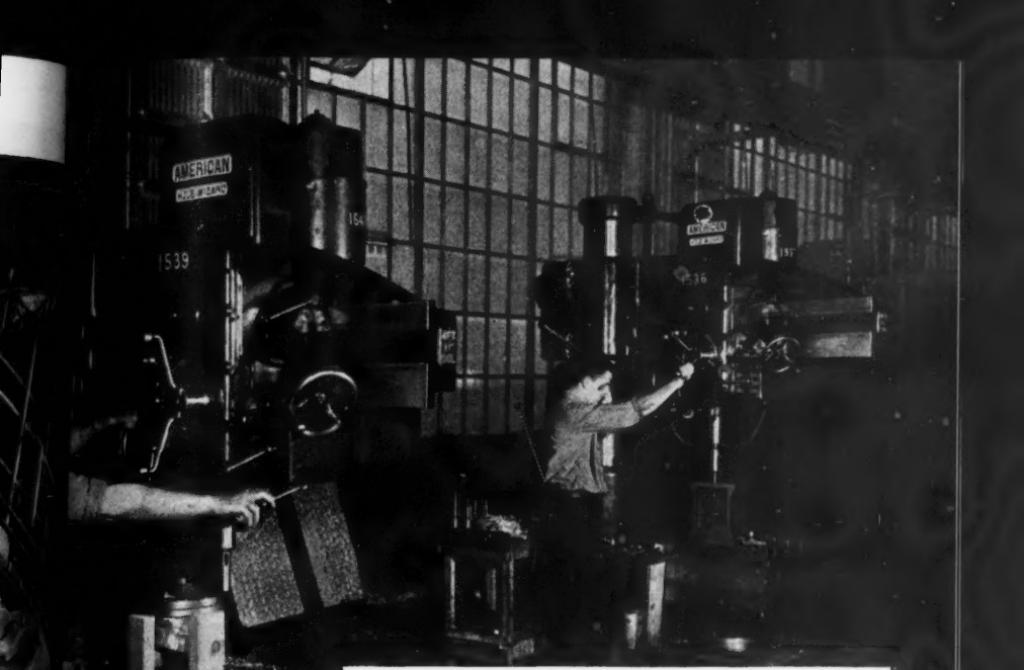
"FILE FILOSOPHY" is as understandable to the mechanic as to the production head. It is an excellent "text-book" for the shop-school instructor. It is particularly helpful to men who have the responsibility of providing the right file for the job.



Here a Geared-Turbine Propulsion Set is Being Assembled in the Ship in Which it Operate. The Low-Pressure Rotor is Already in Position, and the High-Pressure Turbine Rotor is Being Lowered into its Bearings

In the aircraft industries the percentage of women workers rose from less than 5 per cent of total employment in 1940 to 17 per cent in September, 1942. By the end of next year it is expected that there will be more women than men working in this industry.

Of the workers in the communications equipment industry, 48 per cent are women; scientific and technical instruments, 34 per cent; small arms ammunition, 35 per cent; heavy guns and tanks, 9 and 7 per cent; ordnance, 19 per cent.



"AMERICAN" Radials Help Build Submarines

Where accuracy standards are rigid and production essential "AMERICAN" Hole Wizard Radials are meeting the challenge in a gratifying manner.

The two Hole Wizards shown here are hard at work on miscellaneous drilling jobs encountered in submarine production. Because these jobs cover such a variety of drilling, boring and tapping "AMERICAN" Hole Wizards are particularly suited, owing to their flexibility, their ease of control, their boring ability and high speed tapping facilities.

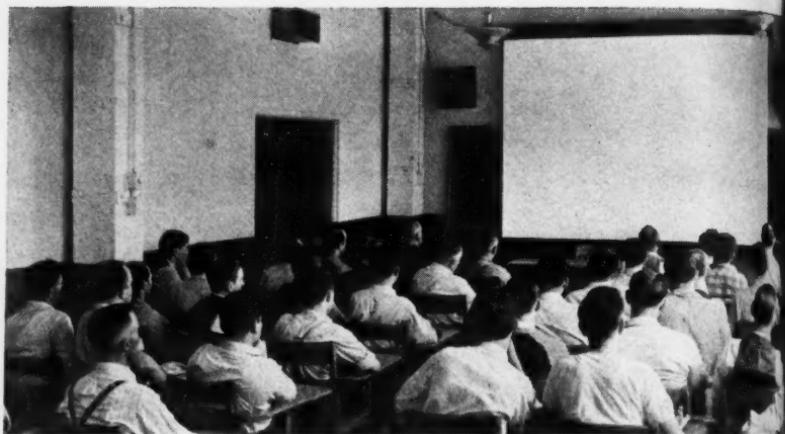
For all out production select "AMERICAN" Hole Wizards — hundreds of contractors are thankful they did.

**The American Tool Works Co.
CINCINNATI, OHIO, U. S. A.**

AMERICAN" Hole Wizard RADIALS

LATHES RADIALS SHAPERS





Classroom Work is Supplemented by a Series of Sound Slide Films and Sound Motion Pictures Which Were Created Especially for Briggs

Briggs Aircraft Training Program

By THOMAS C. PERRIN
Assistant Director of Education

WHEN the Briggs Manufacturing Company first undertook the manufacture of airframe parts and assemblies as its contribution to the Defense Program in 1940, all of the many Briggs plants were busy producing peacetime products at a record pace. Their highly trained personnel were fully occupied and the need of additional manufacturing space and trained aircraft workers presented a serious problem.

A large tract of land, near the main body plant, which in the summer of 1940 was used as a circus ground, became—in less than six months—a new modern aircraft parts plant specifically designed and built

for the job. But the problem of power was not so easily solved.

Detroit was then an automobile manufacturing city where a large number of the available workers were employed on high speed production lines, and many of them were unskilled in the type of precision work required to build planes. Supply of skilled workers was limited.

The first step therefore was to some experienced men from other aircraft companies. With these as a nucleus, a crew of supervisors was formed and sent to the aircraft plants which were building the major assemblies, for training and ob-

on. At about the same time arrangements were made for preliminary training of workmen in the Detroit Public Schools system. Equipment was mostly supplied by the eggs Company, and so the ground work was laid for a comprehensive training program.

A skeleton force of approximately 10 men was built up as a result of the public school training program. These men were used as a beginning to start production and further training was done on the job. The "on the job" training program proved to be very costly in that the new men ran a high percentage of spoilage and necessitated instruction to the point where it interfered with production schedules.

It was then decided to establish within the factory a vestibule school complete with all necessary equipment to train the unskilled workmen at the same time give them actual production experience on jigs and fixtures similar to those used in aircraft production departments. A survey of the labor requirements showed the approaching need of some 300 trained men, and this figure has

since been considerably increased. Tools and equipment were secured; a space in the factory was set aside, and the school was opened in July, 1941. It was decided to train men on three shifts a day at the capacity of the school—namely, 300 students per shift. This, of course, created the problem of how to get a sufficient number of capable instructors.

Since none were immediately available, skilled workers from our own plant were paired off, man for man, with graduate engineers hired from outside sources, who while better grounded in theory, were less skilled in aircraft practice. This combination was a success from the beginning and both groups benefited greatly from the association. Basing our estimated requirements on the 300 men per shift schedule, we hired 60 of these instructors, or one instructor for each 15 students.

Blueprints of the various production jobs were studied and a course in Blueprint Reading was laid out, during which, in fifteen one-hour classes, the student was taught how to read simple drawings, then small parts drawings, and finally complete

of the Induction Tests is a Dexterity Test in Which the Applicant is Required to Move 72 Rivets of Different Sizes from Their Positions to Corresponding Empty Holes in the Same Board





Under the Watchful Eye of the Instructor the Trainee Assembles Air Ducts in Various Small Models and Sizes, Which Gives Him Training in the Use of Trim Jigs and Assembly Fixtures

assembly prints. Charts created by our staff and models to match these charts are used to aid in interpreting and understanding the drawings. Later small parts and their corresponding prints are matched up and discussed in the classes.

Other instructors were assigned the job of writing a fifteen-hour course in information relating to the use of aluminum, its source, its care, and how to file, drill, countersink, rivet and otherwise correctly use this material. Instructions also included information pertaining to aluminum alloys, identification marks and their meanings, as well as complete training in rivet codes, proper sizes and types to use, and how to use them with maximum accuracy and minimum waste.

Another group of instructors was sent into the shop to "job-analyze" each operation for which training was planned so that the shop work in the school would coincide in every way with the type of work the trained worker would be expected to perform when, at last, he took his place on the production line.

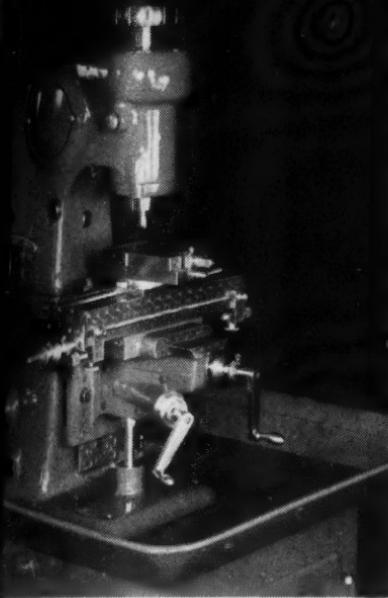
Meanwhile a third course was out-

lined for the benefit of instructors and supervisors on the fundamental teaching and job analysis. A member of the War Production Board-in-charge Within Industry assisted in formulating this course, with all instructors being required to take the same and is conducted along the lines of foremen's conference.

The classroom work is supplemented by a series of eight sound films and sound motion pictures which were created especially for the school and cover such subjects as handling of materials, reduction of waste, how to drill, how to rivet, proper use of time, importance of each operation and inspection. Every trainee sees all of these pictures during his training period.

The shop work program in the vocational school is divided into five major steps.

First, a project was designed which includes practice in blueprint reading, layout, filing, drilling, countersinking, and riveting. The average time to complete this project is four hours, or six days of six hours of shop work and two hours of classroom instruction.



HARDINGE HIGH SPEED PRECISION MILLING MACHINES

HARDINGE BB2V PRECISION MILLING MACHINE

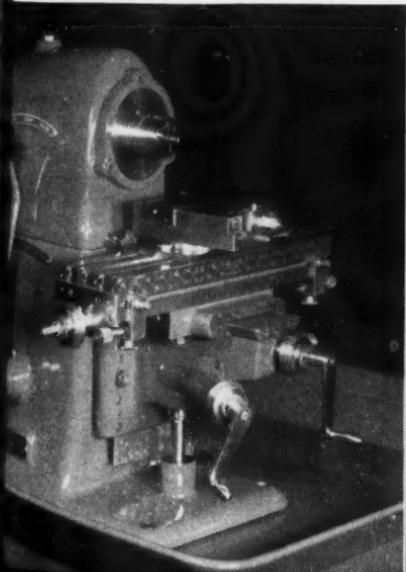
Table: 12" x 3-3/16"
Eight Speeds: 300 to
5000 R.P.M.
Vertical Head has
1/2" Collet Capacity

CORRECT SIZE: Closer proportion in the size of a machine tool to the size of the work means greater economy in the original investment and in the cost of the parts produced.

These HARDINGE Precision Milling Machines are small, compact machines designed to do a volume job on small parts, thus releasing large equipment that is too cumbersome for small work in production, tool-room or development departments.

HARDINGE BB4 PRECISION MILLING MACHINE

Table: 12" x 3-3/16"
Eight Spindle Speeds:
180 to 3000 R.P.M.
Cutter and Index Heads
have 3/4" Collet Capacity



Second, a project requiring two days of practice in drilling out and removing rivets. This is valuable training for aircraft assembly repair work, as more difficulty is experienced in removing rivets without damaging the hole than in assembling them in the first place.

Third, introduction of the student worker to his first taste of actual production. Here, under the watchful eyes of the instructor, he first inspects, then assembles a spar for one of the wing assemblies, in which 1,500 rivets of various sizes are used. This work is checked by a Briggs inspector, after which he makes such repairs as may be necessary. The spar is then checked by a U. S. Navy inspector and goes into the plant to become a part of one of the regular airframe assemblies.

The "standard" on this job is accuracy; not volume, and during the student's four-day stay on this operation he is assisted in every way to

overcome the feeling of "buck" that a new man has on his first job.

Fourth; the assembling of all in various small designs and which gives him training in the of trim jigs and assembly and also practice in blind riveting assembling the spars in the third all rivets are mostly inside the which provides adequate training the work to follow. Usually 10 are required to familiarize him this work, during which he gets practice in layout, filing, trimming, metal forming, drilling and both and blind riveting.

While the average time up to point is 22 days, any worker through greater skill or pre-training or experience can demonstrate superior ability can do as rapidly as his skill and ability permit. All students are required to go through each of these first steps qualifying on each in turn.

"TIME SAVERS" IN ANY PLANT



SCHAUER SPEED LATHES increase production. Burring, Lapping and Polishing of small parts are performed faster and more accurately. Send for Catalog No. 420.



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Hand or Foot Operated Models—Completely Automatic—Air Operated—Variable Spindle Speeds.



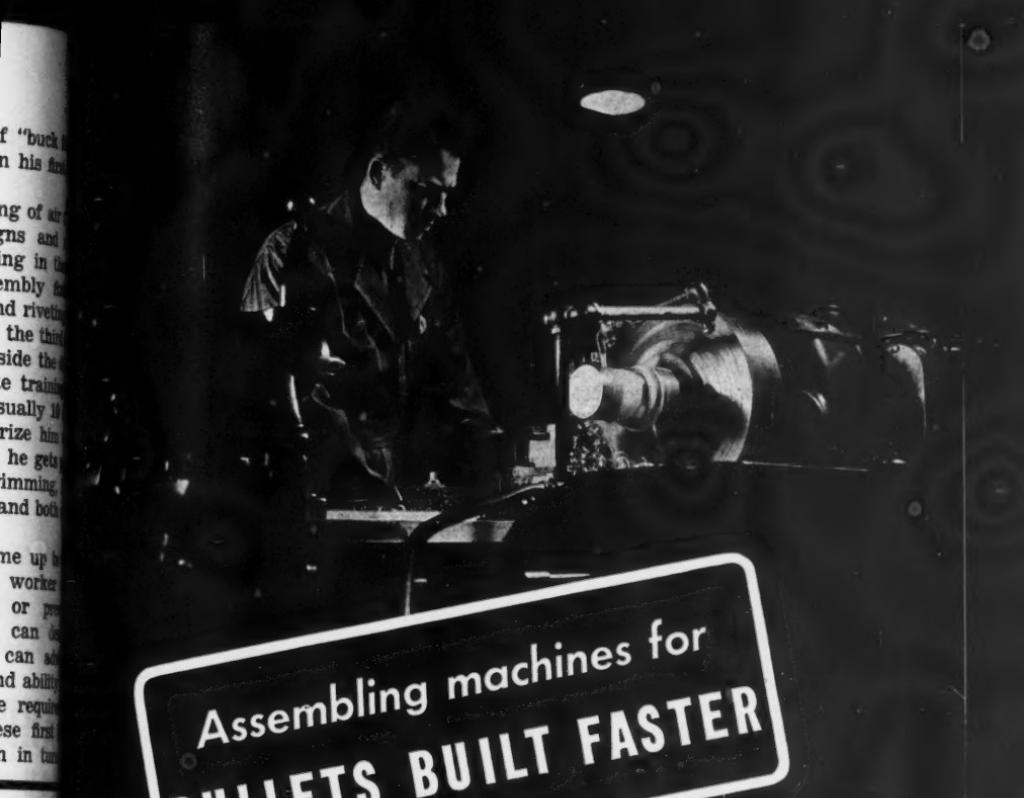
There is a type of Standard SCHAUER SPEED LATHE to meet your individual requirements.

"the originators of today's Speed Lathes"

SCHAUER MACHINE COMPANY

2060 READING ROAD

CINCINNATI, OHIO



Assembling machines for
BULLETS BUILT FASTER

SUNOCO EMULSIFYING CUTTING OIL

helps machine manufacturer prolong tool life by 40%"

Let assembling machines be the wartime specialty of this machine tool manufacturer . . . and one factor contributing to their high production quota is Sunoco Emulsifying Cutting Oil.

Before changing to Sunoco, excessive heat made necessary low machine speeds. Production was limited . . . life poor. At the recommendation of a Sun Doctor in the industry—a metal working expert—the change in cutting oil was made. Improvement was immediate. Tool life increased 40%. Sunoco's exceptional heat absorbing qualities permitted high speeds . . . production was increased 40% and the finish of parts was noticeably better.

This is one example among many where Sunoco Emulsifying Cutting Oil is helping American industry turn out a flood of better war materials—faster. Call in a Sun Oil Company Engineer. Let him show you the value of Sunoco as an aid to increased production in your own plant. He stands ready . . . willing . . . and able to serve you.

For case histories of how he has helped others, write for your copy of "Helping Industry Help America."

SUN OIL COMPANY • Philadelphia

Sun Oil Company, Ltd., Canada



HELPING INDUSTRY HELP AMERICA

NY
10
February
IN PETROLEUM PRODUCTS

The fifth and final step consists of 10 days training on one of the several major jigs which are available, where the worker is given special training for the work he will later be called upon to perform. By having several different types of assemblies in the training school it is possible to match the trained workmen with the labor requisitions received from the plant and always have men available who require very little training on the job. They do, however, have to step up their individual output to match that of the skilled workers with whom they are placed.

The demand for inspectors has been filled by taking the students whose workmanship showed a high degree of accuracy and whose classroom grades denoted a more thorough grasp of the required information, and assigning them to work for about 10 days more under the supervision of the inspector assigned to the school.

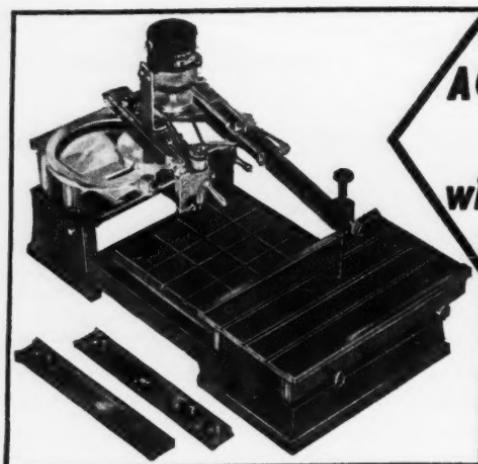
When the war needs caused stoppage of automobile body production, the problem of converting manpower as well as the plants to be solved. Accordingly, all help of outsiders was discontinued and a series of tests set up to check adaptability of the auto workers to this type of work.

Men were called in and, in the order of their seniority, given the production Tests which consisted of:

First—Ten problems in simple fractions such as anyone would need to know in order to read a scale or accurately measure a rivet or drill size.

Second—A dexterity test consisting of ability to quickly move 72 rivets of each of four sizes from their positions in holes drilled to fit them to corresponding empty holes on the same board.

Third—A visual test of sorting



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To create a new tooling principle is an achievement of high order . . . to make its application practical requires the "know-how" resulting from years of experience.

* * *

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FROM THE HUB OF AIR TRANSPORTATION



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HOBES BROACHES SHAPER CUTTERS GEAR CUTTERS
MILLING CUTTERS GROUNDED FORM TOOLS SPECIAL TOOLS

fifty rivets of mixed sizes against time.

Fourth—A filing test consisting of filing a piece of sheet aluminum slightly over two inches square to a perfect two-inch square.

Fifth—A layout test consisting of laying out a five-inch square of sheet aluminum in $\frac{1}{2}$ -inch strips and cutting them accurately along the lines laid out, using a pair of snips.

Experience has since proved the value of these tests, as less than 4 per cent of the workers who passed these tests have failed to complete the training course and take their places in the new work.

When the auto body production ceased, a large number of foremen, supervisors, and even a few plant managers were left without training to properly fit them for the new work, although their previous expe-

rience and executive ability made them valuable assets at the beginning of a period of expansion such as this War Production Program has become. These men were all taken into the school and given the same shop training as the student workers, plus three hours of classroom instruction daily, such as is given to all instructors. They have thus been able to supervise the conversion of the body plants to aircraft work and take their rightful places in opening up new departments and getting new aircraft parts contracts under way with a minimum of delay.

The training program at first took an average of 440 hours but careful supervision has permitted the cutting of the time to an average of 200 hours, 30 of which are spent in classroom instruction in Blueprint Reading and Related Information, and the balance in actual shop practice.

Eight hundred sixty-four workers

HAMILTON

SWISS TYPE GEAR HOBBERS



...for accuracy and speed
in hobbing of

pinions, wheels, gear sectors and
similar component parts of Aviation
Instruments, Time Fuzes, Meters,
Clocks, Watches, and other precise
mechanisms.



No. 00 SPUR
GEAR HOBBER
for work up to
2" diameter.

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SPIRAL GEAR
HOBBER
for work up to 6"
diameter.



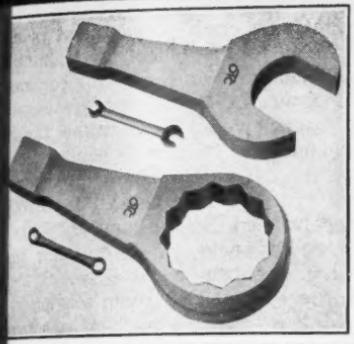
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Exclusively Sold by
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OTC IN THE BATTLE OF Production



**EVERY PIECE OF FACTORY EQUIPMENT
MUST BE EFFICIENTLY MAINTAINED"**

DONALD M. NELSON

an important and ever-increasing "task force" of OTC TOOLS is doing a vital machinery maintenance job in War Factories, Shipyards, R. Shops, Power Plants, Mills and Mines . . . as well as on tanks, trucks, airplanes, ships.

OTC TOOLS

GIANT SLUGGING WRENCHES
HEAVY DUTY BOX WRENCHES
PULLERS AND PUSH-PULLERS
SPECIAL TOOLS TO ORDER



OWATONNA TOOL COMPANY

OWATONNA, MINNESOTA

were transferred to production this June and over 5,000 workers and supervisors have been trained by this program to date. The progress of the Briggs Company in handling its aircraft parts contracts is a testimonial to the effectiveness of this plan.

Another training school patterned after this one has been opened at the Briggs plant in Evansville, Indiana, and is rapidly swinging into production of trained aircraft workers from the large number of former body plant employees in that city.

Wage scales have been very fair, the male student worker getting 75c per hour during the first four weeks of this training and then being increased to 90c per hour for the balance of the period in the school.

Consideration has also been given to the rapidly approaching man power shortage, and women workers have been inducted into the school and given training similar to that given

to the men. On jobs which they are equipped to handle, such as drilling, riveting and burring, and small part inspection, they are doing very well and as time goes on more and more of them will be called to replace the men who enter the armed forces.

Recently a new department has been added to the school for training of men in layout and checking for inspection work. These men are carefully interviewed to determine their knowledge of blueprints and shop mathematics and the use of precision instruments. Under the guidance of an experienced layout man they are given four weeks of instruction in the fundamentals of this work, including a special classroom session in blueprint reading. This has to some extent relieved the demand for skilled men of this type.

As time goes on and new contracts are received, it is planned to change the jigs and fixtures in the school to

PORABLE ELECTRIC HONING and FILING TOOL

(RECIPROCATING ACTION)

Eliminates Hand Operations!

MODEL C— $\frac{3}{8}$ " STROKE
MODEL E— $\frac{1}{8}$ " STROKE



Conserves time and energy by mechanically reproducing the natural push and pull action of hand operations...filing, honing, polishing, sanding, sawing, etc....when equipped with the proper accessories. Will prove a boon to every Tool, Die, Mold, and Machine Shop.

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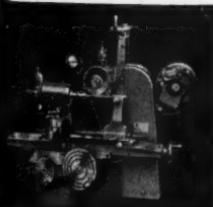
EG-10
EXTERNAL

Power or Hand Feed
8" Between Centers

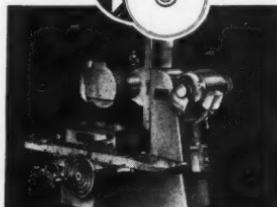


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Power or Hand Feed
Grinds $\frac{1}{8}$ " to 3" Holes



G-1 FLUTE GRINDER



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HAND FEED ONLY



TRS-1 CUTTER GRINDER

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The Model No. 150 Heavy Duty Drill is of the Universal Quick Change Type with extreme flexibility of speed and feed changes. It has ample capacity to drive $1\frac{1}{2}$ " diameter high speed twist drills. It is also adapted to boring, counterboring, facing, forming and tapping operations.

To give increased flexibility to the machine the vertical column assembly is of 2-piece design; lower frame which bolts to base arranged to carry standard plan table. The entire upper unit assembly with speed and feed train drives for rotating the spindles and for feeding spindles is mounted on the lower frame. Twelve quick changes of speed are provided.

Also built as single purpose type.

Further details are contained in a new attractive bulletin which is now available.

BAKER BROS., INC.
TOLEDO OHIO

coincide with the immediate training needs, and at all time be ready to supply trained workers for whatever production may require.

More accurate workmanship, greater production speed, and a noticeable reduction in scrap material are traceable to the efforts of the school to train workers in better shop practices. Unemployment among the former employees has been reduced, production schedules have been maintained or exceeded. Thus the training has been and is still doing its share in the overall war effort.

"Simplified Pricing Methods for Negotiation of Government Contracts." Even at reasonable and normal prices an unforeseen and abnormally large volume of business can so tremendously enlarge dollar earnings that profits appear excessive when compared with a firm's pre-war average annual profits. The added profits are the result, of course, of savings in unit overhead costs. This fundamental is established by a paper, "Simplified Pricing Methods for Re-Negotiation of Government Contracts," published by The Eddy-Rod Nickels Co., Harvard Square, Cambridge, Mass. The paper, however, goes more than just make this point; it visualizes and dramatizes the significance of it in a manner that is interesting and potentially valuable to every one holding a government contract.

Visualization is accomplished graphically. An E-R-N Profit-Graph picture emphasizes the extremely rapid increases in profits which accompany large or small increases in volume of business. An E-R-N Quantity-Discountrate Calculator shows automatically, at any per cent of sales prices, the increased profits which result from various increases in volume. It enables the executive to determine, without tedious computation, that which is so essential in calculating the size of any quantity discount; that is, it tells him the amount of additional profit created by any specific increase in volume.

The paper also proposes a detailed plan for repricing and outlines certain points which should be made clear as a basis or prelude to any equitable negotiation of past prices or negotiations of future prices. Copy free to executives upon request.

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- Gusher Pumps give you a copious, dependable, trouble-free flow of coolant for speedy, efficient production. You get the advantages of many patented and exclusive features.

The leaders in machine tool production depend on Gusher Pumps. Our line includes immersed types, tank units, pipe-connected types, flange-mounted types and plain drive types.

From a dribble to 200 g.p.m. Learn what the leader in the coolant pump field has to offer you. There's a Gusher to meet your needs. Write.



Model 5-P3

This new Gusher has a large mounting flange so as to be interchangeable with larger Gusher Pumps. Right or left discharge. 1/10 H.P. Maximum Capacity; 10 g.p.m.

THE RUTHMAN MACHINERY CO.
1817 READING ROAD CINCINNATI, OHIO

LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

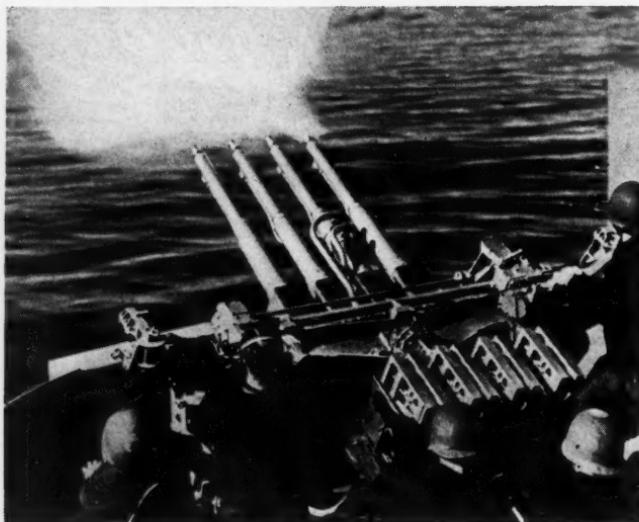


Fig. 1 — This official U. S. Navy photo shows the 1.1-inch multiple anti-aircraft gun, now in service on every type of American fighting ship in action. This gun fire unit, firing hundreds of shells a minute at Japanese planes, played a significant role in the battles of Pearl Harbor, the Central Sea and the Solomon Islands. Record-breaking production of the gun mount was made by the Westinghouse Electric Elevator Company, which was disclosed today. This gun is affectionately called "The Chicago Piano."

(Official U. S. Navy Photo)

Westinghouse Builds Gun Mounts For Navy

RECORD-BREAKING production of gun mounts carrying four rapid-fire anti-aircraft guns—the weapons which hurled hundreds of shells a minute at Japanese planes in the battles of Pearl Harbor, Midway and the Solomon Islands—has been disclosed by the Westinghouse Electric Elevator Company, Jersey City, New Jersey.

Large-scale manufacture of the new multiple gun units at a rate exceeding contract quota was revealed by Frank C. Reed, President of the Elevator Company, at the time of the company's third official citation for outstanding war production. The new gun units are now on active duty on every type of American warship.

Mr. Reed made public, with Navy authorization, a letter received from

Rear Admiral William R. Furlong, Commandant of the Navy Yard at Pearl Harbor, in which the Navy officer referred to the 1.1-inch anti-aircraft gun as "a wonderfully useful piece of work. You should have seen those guns in action here at Pearl Harbor on December 7th," Admiral Furlong wrote. "They were most effective and accounted for quite a number of Japanese planes. I certainly was proud of the way they operated."

Mr. Reed pointed out that the American 1.1 gun, so-called because it fires a shell 1.1 inches in diameter, has been produced by Westinghouse at a saving to the Navy of more than 10 million dollars in cost and 4,000,000 man-hours of work.

Before Westinghouse tackled the

This job in the summer of 1940, each gun mount required 8,500 man-hours of labor and cost about \$27,000—but assembly line production methods enabled the company to turn out each unit with about 2,100 man-hours of work at a cost of about \$12,000. Differences between estimated cost and actual cost were returned to the government. By May, 1942, the company was turning out nearly 40 percent more mounts each month than its contract called for.

Guns Water Cooled

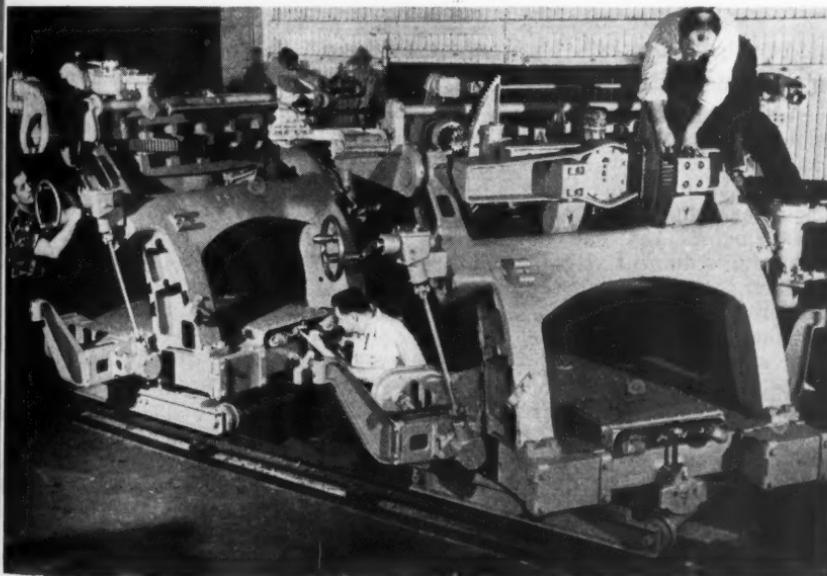
Weighing 14,000 pounds, each mount consists of an adjustable four-foot long horizontal gun support, installed in an H-shaped stand which is moored to a revolving steel base. Each gun support has four large grooves, 9 by 13 inches, into which

water-cooled gun barrels are inserted. The four guns, although not synchronized, are fired in nearly simultaneous bursts by a single trigger mechanism on the left side of the unit.

Guided by sights on both sides of the unit, Navy gunners train the guns on flying targets by quickly moving them up or down and left or right. When necessary, the entire mount can be swung in a complete circle. The guns are aimed manually by a series of easy-turning cranks near the sights, and also by hydraulic power controls which are installed when the gun units reach a ship.

Maneuverability of the mounts depends upon precision manufacturing at extremely close tolerances. This is insured by 4,800 inspections during the manufacturing process, or about six inspections for each of the unit's

Fig. 2—The workmen shown here are greasing moving parts in mounts for Navy 1.1-inch anti-aircraft guns, on final assembly line at Westinghouse Electric Elevator Company. In action the mounts are equipped with four rapid-firing water-cooled guns, capable of firing in almost simultaneous bursts. The guns are credited by Rear Admiral William H. Furlong, Commandant of the Navy Yard at Pearl Harbor, with "accounting for quite a number of Japanese planes" at Pearl Harbor on December 7.



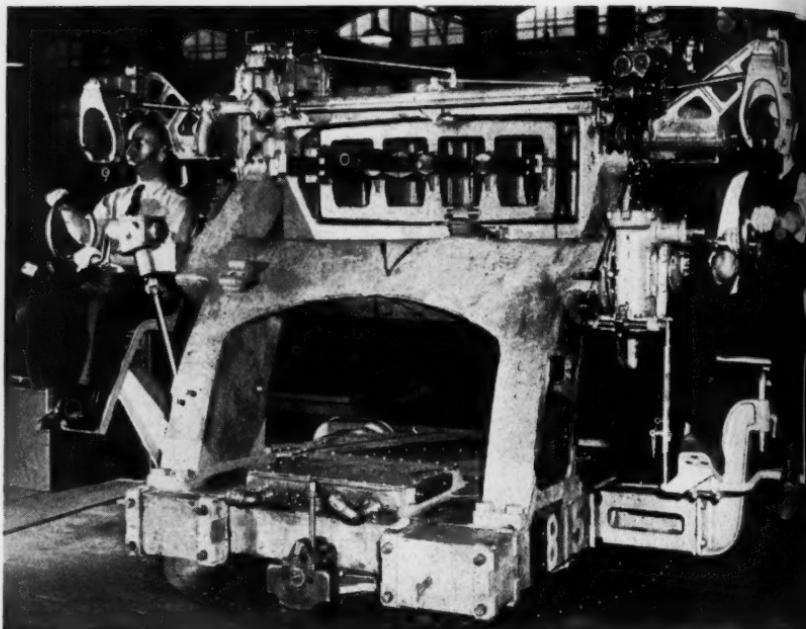


Fig. 3—Here a mount for a Navy 1.1-inch anti-aircraft gun is tested for microscopic accuracies. Inspectors are testing gun sights for alignment with grooves where gun barrels will be inserted. Westinghouse cut cost of each unit from \$27,000 to \$12,000 and work on each from 8500 man hours to 2100.

800 principal parts.

"Dead Flat" Surfaces

Principal surfaces must be levelled to a point that engineers call "dead flat," with an allowable discrepancy of 0.0002 inch. Other parts must be accurate within 0.0004 to 0.001 inch.

Just before the gun mounts are ready for shipment, sights that are used in actual combat are installed temporarily and tested for accurate alignment with gun barrels. Maximum allowable tolerance in this test is one minute, or one-sixtieth of one degree—which would result in a deviation by the gun projectiles of not more than ten and one-half inches per thousand yards.

Accuracies required for the units' flat surfaces are too delicate to be achieved by machines, so the re-

quired precision is obtained by hand scraping. When the elevator company started production of these mounts it had only one scraper in its factory, and previous experience shows that it required 15 to 20 years to train a man to be a scraper.

One hundred scrapers were needed quickly, so the company set up a training program with its one experienced scraper in charge. Men who showed an aptitude for that kind of work were hired and in three months were becoming first-rate scrapers.

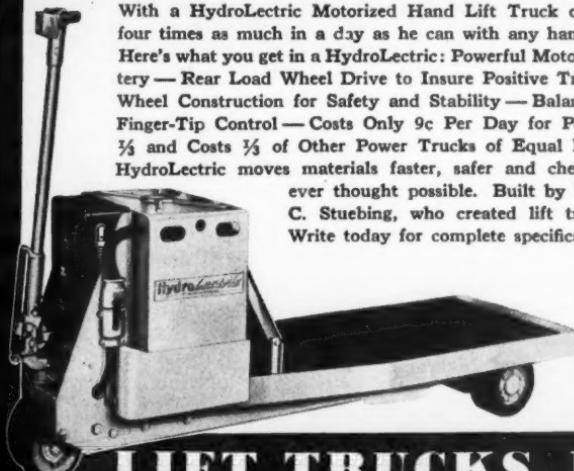
When company officials were confronted with the problem of converting the plant's production of elevators and electric staircases to anti-aircraft gun mounts, Mr. Reed said they found their major needs were manpower and tools.

Proved BY 12 YEARS of 8 hour-a-day service



IN AMERICA'S LEADING INDUSTRIES

With a HydroLectric Motorized Hand Lift Truck one man moves four times as much in a day as he can with any hand pulled truck. Here's what you get in a HydroLectric: Powerful Motor — Large Battery — Rear Load Wheel Drive to Insure Positive Traction — Four-Wheel Construction for Safety and Stability — Balanced Handle — Finger-Tip Control — Costs Only 9c Per Day for Power — Weighs $\frac{1}{2}$ and Costs $\frac{1}{4}$ of Other Power Trucks of Equal Load Capacity. HydroLectric moves materials faster, safer and cheaper than you ever thought possible. Built by W. R. and W. C. Stuebing, who created lift trucks in 1910. Write today for complete specifications.



LIFT TRUCKS, INC.

W. C. STUEBING, President

2425 Spring Grove Ave., Cincinnati, Ohio
Stuebing also manufactures hand lift trucks (not motorized)
in capacities up to 8000 lbs.



Fig. 4—TESTING LINE SIGHTS—Inspector checking precision accuracies of Navy aircraft gun mounts coming off production line. By peering down boresight at a fixed target, he determined if grooves for gun barrels are correctly aligned with gun sights. Four rapidly moving anti-aircraft guns will be installed in the slots.

To meet the first problem, expert factory men were assigned by the company to serve as instructors at Dickinson High School in Jersey City, N. J., where training classes were being conducted on a 22-hour basis. For six to eight weeks men were drilled in fundamentals of machine operation. They were taught to operate lathes, screw machines, boring mills, grinding and milling machines, and also received instruction in blueprint reading, measuring instruments, shop mathematics, machine technology and shop safety.

Upon completion of the course, men hired by Westinghouse were given additional instruction at night, to supplement their work in the factory. Although some of the men had had no mechanical experience, many of them had been garage mechanics.

In addition to supplying instructors, Westinghouse furnished Dickinson High School and the Bayonne, N. J., Technical High School with hard-to-obtain machine tools. About 625 men were recruited and trained for work on the gun mounts. Experienced employees were promoted to more difficult jobs and apprentices

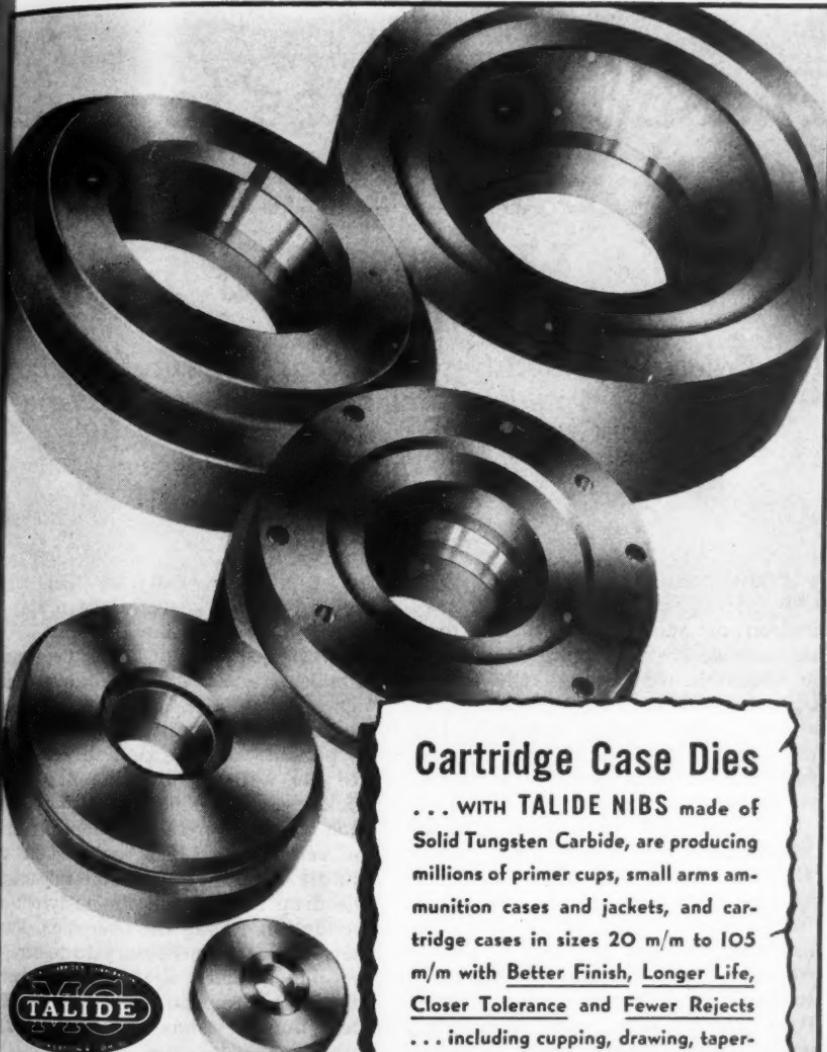
trained at the public high schools were assigned to fill their posts.

Built 2,000 Special Tools

Tools for production of the gun units were built by the Westinghouse Elevator Company and other Westinghouse divisions because regular tool manufacturers were overburdened with orders. Some 2,000 special tool jigs, and fixtures were turned out by Westinghouse at a cost of \$500,000.

Disclosure of details on gun mount production was authorized by the Navy because the Elevator Company soon will complete its contract. For its performance on this order, the Westinghouse Electric Elevator Company received one of the first "E" production pennants awarded, in September, 1941. Six months later the Navy "E" Burgee for continued excellence of production was awarded.

On November 23rd, Capt. Sherman S. Kennedy, U.S.N., manager of the New York Navy Yard at Brooklyn made the presentation of the third award—the Army-Navy "E" Burgee with two stars—at a ceremony in the plant yard.



Cartridge Case Dies

... WITH TALIDE NIBS made of Solid Tungsten Carbide, are producing millions of primer cups, small arms ammunition cases and jackets, and cartridge cases in sizes 20 m/m to 105 m/m with Better Finish, Longer Life, Closer Tolerance and Fewer Rejects ... including cupping, drawing, tapering, sizing and pointing operations.



METAL CARBIDES CORPORATION
YOUNGSTOWN, OHIO

TUNGSTEN CARBIDE TOOLS · DIES · WEAR PARTS

Plastic Punches for Drop Hammer and Hydraulic Press

The Article Presented Here Has Been Prepared from Data Compiled by Tool Research Engineering for the Vega Aircraft Corporation, in Collaboration with Leon Champer, Chief Chemist for the Plastalloy Company

MORE consistent forming of sheet metal parts and more rapid production of such parts in the drop hammer or hydraulic press can now be accomplished through the use of a plastic punch. Tough, elastic, possessing great impact strength, this new thermoplastic is 100 per cent reclaimable without sacrifice of physical properties.

Early in 1942 the Vega Aircraft Corporation, like many other industries, was faced with the necessity of conserving critical metals. In an effort to find a desirable substitute for lead and Kirksite punches, a plastic product of the Plastalloy Company of Burbank, California, was utilized. First trials were very promising, hence many further tests followed, formulations being constantly altered to meet the high impact required for such metal forming.

Progress has been slow but decidedly encouraging. While some of the problems have not been entirely overcome, the method has reached such a degree of workability that results are here presented to the in-

dustry. It is hoped that others profit by the research—and mistakes—that have been made.

A brief review of steps necessary in making and using a lead drop hammer punch will serve as a basis for judging the advantages of the plastic punch. Lead is cast to the size die without allowing for metal run the thickness of the part. Thus, the must be set up in the hammer using rules the vertical surfaces "scraped in" the die to allow for metal thickness. The drop hammer is obviously out of production during the operation. Furthermore, it is often necessary to re-size or re-shape the punch after a number of points, the lead punch tends to flatten and spread.

Small radii on the punch are likewise beaten back in production, resulting in larger radii than obtained originally, so that rubber strips must punch into the die as to fully cover the metal down to the small radius thickness. Since this condition frequently arises according to the drawings, when as few as ten parts have been formed, production on the lot is stopped according to the drawings.



Formed on Double-Action Press with Plastic Punch as Demonstrated by Anne Potucek and R. Wooton of Vega Aircraft Corporation, By Using Plastalloy Plastic Punch for This Type of Forming, Vega Does a Better Job Faster and More Economically

the parts are appreciably slowed. An alternative is to run the whole lot through and then hit the parts during a second run, either using rubber. Either method, however, involves a loss of time which is avoided when a plastic punch is used. The plastic punch, like lead, is cast directly to the die without clearance or re-scraping metal thickness. Beyond this point, the simplicity and economy of the same plastic punch method becomes apparent:

1. The punch and die are set up in the drop hammer.
2. Production begins immediately. It is unnecessary to scrape the punch into the die. Being elastic, it compresses to accommodate all metal thickness of the part, thereby accounting for its excellent forming characteristics. The same qualities account for the consistent form-

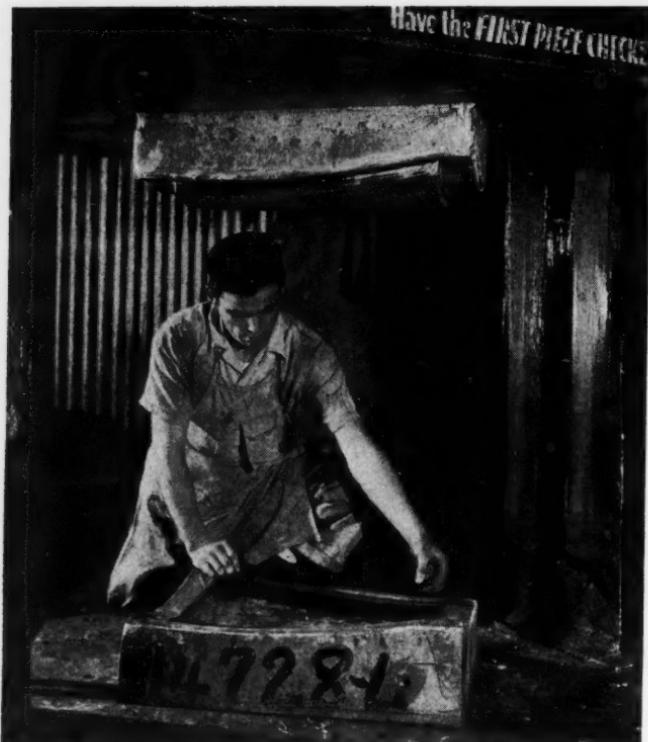
ing of small radii, beads, and the like. It is unnecessary to use rubber strips to form beads.

The useful life of a plastic punch has proved many times that of lead. In general, the plastic punch seems to possess the same characteristics as rubber under pressure and, when used in the drop hammer, combines the forming advantages of impact. It most consistently forms the part true to the die.

Other savings in production time and expense are illustrated by the following typical example of the results obtained by the use of a lead and plastic punch at Vega.

Kirksite Die with Lead Punch

1. Hit approximately 100 parts one time.
2. Anneal.



Have the FIRST PIECE CHECKED

Rubber Strips are used here to hold the Metal Part in the Die. When a Lead Punch is Used to Force Parts in the Die Hammer, one Rehit is required when a Plastic Punch is used. The Delays and Losses resulting from the use of This Time-Delaying Method is entirely Eliminated by the Use of the Plastic Punch.

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3. Pour new punch.
4. Rehit 10 parts.
5. Rehit 90 parts using rubber strips to force out radii. (From three to six rehits may be required to produce a satisfactory part.)
6. Finished.

Kirksite Die with Plastic Punch

1. One fairly good blow to set.
2. Three blows in rapid succession.
3. Finished.

It is seen that by using a plastic punch an annealing operation and a rehit operation have been avoided. Foundry time as well as drop hammer time is saved, since it is unnecessary to pour a second punch.

It should be understood that plastic

punches, in the present stage of development, cannot be used on all types of jobs; those parts which are most adaptable to this method of forming may be determined readily. It has been found, for instance, that plastic punches, due to their rubber-like nature, do not iron out wrinkles as readily as lead or Kirksite. But due to their close fit, fewer wrinkles occur in the first place. This type of punch is less successful, in most cases, in forming stainless steel parts. Often the same part in aluminum would form well.

Certain precautions are necessary when setting up the punch in the hammer in order to avoid subsequent cracking of the punch. Threaded inserts located in the punch should be held up with holes in the ram of the hammer. Otherwise, when the studs which are screwed into the insert are forced into the hammer, stresses are set up in the plastic which are considerably multiplied by impact.

ARD Special PRECISION TAPS

VARD High Precision Industrial Taps: always made to order from finest high speed steel available. Each step in their production is precision checked. Furnished commercial ground, precision ground, or ground to special tolerances as desired. VARD Taps supply maximum accuracy.

Prices and delivery dates furnished upon request.

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PASADENA, CALIFORNIA, U.S.A.

SPIRAL FLUTED TAPS: made with either right or left hand spirals as desired.



ACME TAPS: made in sets for special jobs, or in a combination with rough and finished threads on same tap.



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TWO-PIECE TAPS: in sizes over 2-in. Tap proper made of high speed steel; shank of mild steel. Shank can be used with several sizes cutting body.



POWER DRIVEN FORGE HAMMERS

Made in 5 sizes—
25 lb to 500 lb ram
(illustrated here is
250 lb ram) Adap-
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ideal piece of mod-
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Adjustment for different thicknesses of dies and material is provided—an outstanding Murray feature. Extremely powerful, yet simple in design, and so flexible in operation Murray Power Driven Forge Hammers can be operated under perfect control, with little effort. Stability is built into them, and this means longer life and less maintenance cost. The ram design is a special feature. Ram is free from any obstruction thereby assuring full vision of the work, which makes possible use of longer guide. Write for details, and ask us about our repair and parts service.

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Wausau, Wisconsin

Established in 1883. Offices in Principal Cities

the punch when it is in use.

Hole locations in the Vega hammers are not uniformly located, this difficulty has been overcome using $\frac{3}{8}$ -inch studs in $1\frac{1}{8}$ -inch holes. One-inch studs are normally used for lead punches. Nuts used on the studs must be firmly tight only, "cinched up" with tremendous pressure as when a lead punch is used.

Since most breakage of punches has been found traceable to cracks developing at the metal inserts, the precautions alone have served to reduce such troubles to a minimum. Results are more successful, also. Plastalloy is warm (around 75 deg. to 100 deg. F.) when set up in a drop hammer. These precautions should be observed even though the Plastalloy Company has now developed a material that the drop hammers, in most instances, have not been able to break.

Hydraulic Press Punches

Success with Plastalloy in the drop hammer field led to the development of Plastalloy punches for use in the double action hydraulic press. The long hours of tedious grinding required to fit the punch to the die and to provide for metal thickness are avoided because, here again, the plastic punch is poured directly into the die. A limited amount of clearance of sides or shoulders is sometimes found necessary in order to secure better bottoming as, for example, when beads are to be formed in the bottom of a part. However, if this must be done it can be accomplished while the punch is in the press. When Kirksite is used, the punch and die are pulled and later set up again for another trial. Thus the plastic punch saves press set up time.

Generally speaking, the punch is merely poured directly to the die and set up in the press, ready to go. Due to its elastic nature the punch forms the part true to the die. Normal

Will Your "FORTRESS" Be Ready On Time?

Think of the months of training and practice this bomber crew put in before they were ready for the real test.

ALTER EGO: And, think of the years of effort engineers and shop men put into the development of the "Flying Fortress" . . . all to enable the crew to rule the airways — to navigate in a bee-line to the destination, fight off "competition" all the way, hit the target and get home safely.

Like the *YEARS* of preparation that'll be required to develop *fortresses* of knowledge before business crews can expect to rule the post-war market ways.

ALTER EGO: Right! It'll take shrewd management to steer a course of profits . . . ingenious designing to fight off tough competition . . . efficient production to hit the mark of rock-bottom costs and top quality. All of this to survive.

All of which is embodied in the practiced use of arc welding. There's our fortress for survival in the Battle for Business. Let's start developing our welding knowledge NOW by consulting Lincoln.

**Ask your inner self if time isn't getting short
for post-war planning**

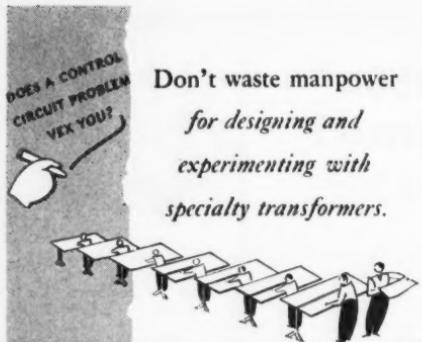
then I said to myself—

**WELDED PRODUCTS
HIT THE TARGET**

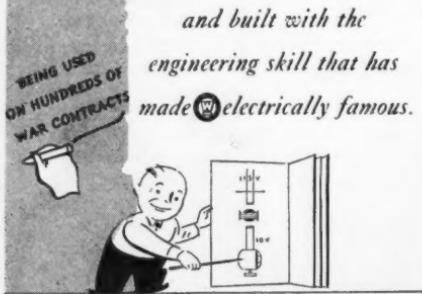
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CLEVELAND, OHIO**

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Don't waste manpower
for designing and
experimenting with
specialty transformers.



DEPT. 7M, WESTINGHOUSE ELECTRIC & MFG. CO., EAST PITTSBURGH, PA.



production difficulties are obvious encountered, but they are solved in any manufacturing problem. For example, it was found difficult to form a number of parallel beads located in the bottom of a certain Vega part. With a little experimenting, however, it was found that good beads could be obtained by merely increasing pressure. In fact, it was found that enough pressure could be applied to tear the part around the bottom beads.

The following is a comparison of the two methods of making punches:

Kirksite Punch

1. Make templates.
2. Make plaster pattern.
3. Cast punch in sand, using mold taken from plaster.
4. Grind in punch to fit die, less metal thickness (time: 5 days).
5. Run parts.
6. Anneal.
7. Hit on drop hammer.
8. Rout (trim).

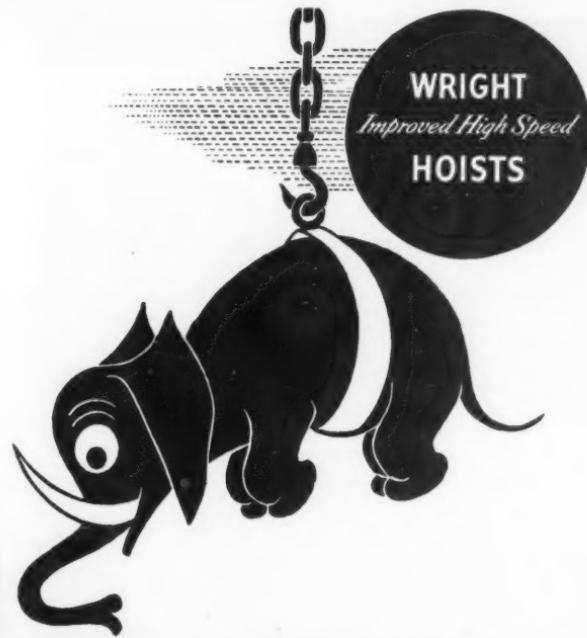
Plastic Punch

1. Pour directly to die.
2. Clear for metal thickness where necessary. (Time: 3½ hrs.)
3. Rout (trim).

Casting Plastic Punches

To cast a plastic punch, ordinary wood sides are built up around the die and the inside wood surfaces are lined with tin. Fillets are made with molder's clay. Sides usually extend about 10 inches above the top of the die, resulting in a thicker punch than is usual in lead. Experience has shown that impact is better absorbed and transmitted when the plastic punch is about 25 per cent greater in thickness than would be a lead punch.

Two distinct Plastalloy materials are supplied and combined to form the final casting compound for punches. This is done to facilitate melting or preparation for casting. For convenience, these materials are



DON'T OVERLOAD!

WRIGHT HOISTS are built to carry more than their rated capacities, but like other well-made pieces of mechanical equipment they should not be overloaded.

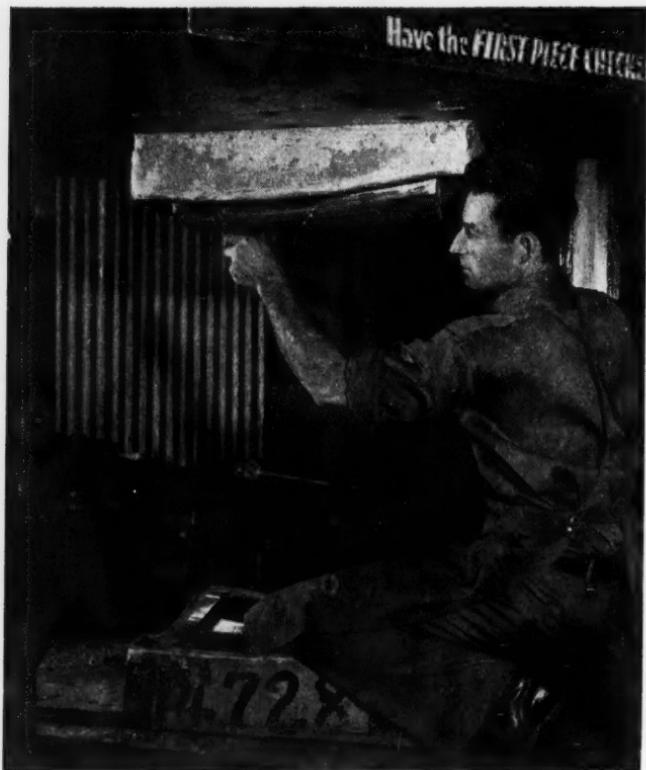
Watch the bottom hook. **WRIGHT** load hooks are drop-forged from special steel which, when overloaded, give visible warning by opening slowly. When the bottom hook has started to open, look to the top hook, for it too may be reaching a danger point.

Watch the load chain. **WRIGHT HOIST** load chains are exceptionally high in tensile strength and elastic limit. Excessive overloading will stretch the chains out of pitch, thus preventing proper fit with load wheel pockets. This results in destructive wear to both chain and load wheel. Keep your chains well lubricated for long life. Take proper care of your **WRIGHT HOISTS**.



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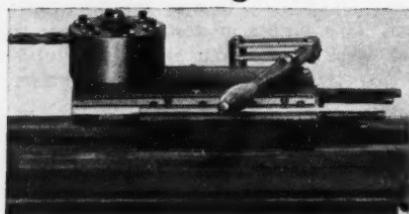
H. K. Dawson Shows How the Drop Hammer Must Be Set Up to Allow for the Thickness of the Metal Workpiece. Drop Hammer is of Production Design for this Operation. It uses a Plastic Punch Used. This Long Time is Avoided by Elastic, the Plastic Punch Recalls Sufficiently to Accommodate the Material in Process; Thus the "Spring" in the Plastic Punch Prevents Forming Characteristics Previously available.

termed Plastalloy "A" and Plastalloy "B." The former has a low melting point, while the melting point of Plastalloy "B" is considerably higher.

Plastalloy "A" is first melted to start a batch. When it has reached

while the mixture is being melted, mentioned earlier in this article, Plastalloy is 100 per cent reclaimable. Used or broken punches may be broken into chunks and remelted as indicated above. To attempt to re-

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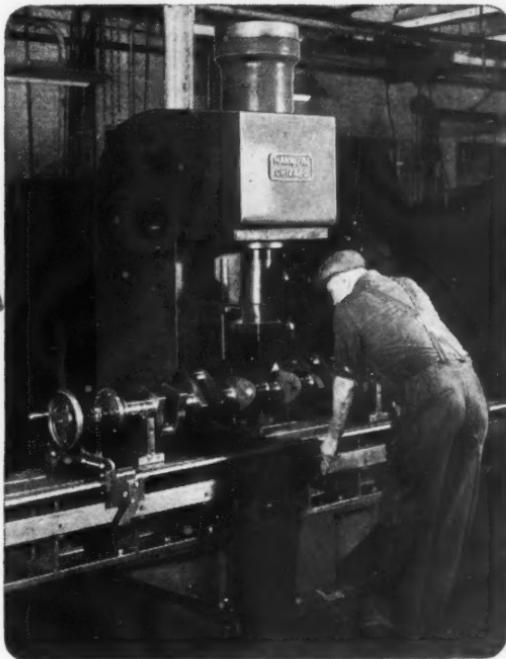
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Hannifin standard presses offer many advanced features of design and construction, and may be readily modified to meet individual requirements. For help on any problem of production straightening, forming, press-fit assembly, or similar work involving the application of pressure, write for press bulletin, or consult Hannifin engineers for specific recommendations.

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chunks directly often results in burning them before they have reached a state of fusion, hence remelt material should be added to a batch of new liquid.

The mixture is heated to and maintained about forty-five minutes at a temperature of 205 deg. C. (401 deg. F.), at which time the heating agent is cut off and the mix allowed to cool to 175 deg. C. (347 deg. F.), being agitated continuously.

While at this temperature the melt is cast into the Kirksite die, being poured through a special funnel (tin or similar material), the lower end of which is kept below the surface of Plastalloy in the die. Lapping of the material, which tends to cause weakened planes, and trapping of air is so avoided. Immediately after the punch is poured, the inserts, which are located by means of studs to a spider, are lowered into the punch to a predetermined depth.

The top of the insert preferably should not lie more than one inch below the surface of the finished punch. Precautions that will insure normal and properly located inserts are: (1) level die; (2) spider parallel to die; (3) accurate spider; (4) holes for studs through spider to offer a tight fit yet hold studs close to 90 degrees. Attention given these details will, in a large measure, reduce possibility of breaking the punch in use.

The material is made to shrink from the top of the punch down as it cools, which is done by using standard cabinet-maker's clamps to apply pressure to a wood plate placed over the top of the punch after first covering it with metal. The material is then prevented from shrinking away from the die and is forced into perfect conformity with it.

Cooling requires considerable time depending upon the size of the casting, so that the total time required



and there is a wide selection of standard sizes available ranging from 8" x 12" to 48" x 120". Smith MASTER Surface Plates have successfully met Aircraft and Ordnance specifications requiring a surface tolerance of ten-thousandths of an inch. Many plants have reordered several times. When your inspection or production departments demand action, you can depend on Smith's enlarged facilities for prompt deliveries. For sizes available and prices, write, wire or phone.

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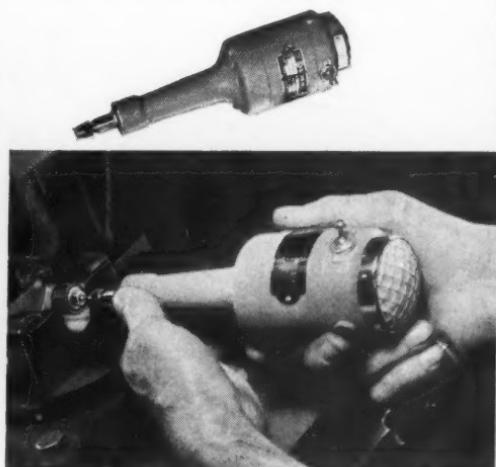
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Most popular model, widely used in production. Has $1/10$ h.p. motor, idles at 22,000 r.p.m., weighs 47 ozs. Maximum power with minimum weight.

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PRECISION GRINDERS

to prepare, case, and cool a plastic punch is more than that required for one of lead. However, when operations permit having a pot of Plastalloy continuously ready to cast, as is done with lead, the over-all time will be reduced about one-half, for it requires around six hours to cook up a batch.

The top surface of the cooled punch is not ordinarily smooth nor parallel to the base of the die. Therefore, the punch is left in place in the die, after forms and clamps have been removed, and is surfaced parallel to the base of the die. This is done on a planer or similar machine although the operation might as easily be done by a simple set-up using a hand router.

Plastalloy may be cut or worked with any kind of cutting tool. It is not abrasive and does not dull tools. Being a thermoplastic, it cannot be

ground or sanded, and tends to give up tools that generate heat rapidly such as circular and band saws. However, it may be drilled, tapped, planed or worked with hand woodworking tools. Further, Plastalloy is easy to handle, inasmuch as it weighs only 68 pounds to a cubic foot.

Under proper conditions and within certain bounds of application Plastalloy produces better and more uniform parts, and does it faster than other materials. It is believed that its possibilities have not yet been thoroughly developed. Experiments are under way at Vega which—if successful—will make it possible to cast a die from a plaster pattern and a Plastalloy punch into this die ready to put into work on a press, all without machining.

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AMERICA'S War Production Army was not without its casualties in 1942. During the year just ended more than 18,000 war workers were

killed and approximately 500,000 injured as a result of accidents. This figure represents the number killed and injured in war plants only.

Safety engineering is more important at the moment than ever before because (a) every available person is needed either fight or work for the safety of the nation; (b) with a definite limit to the supply of skilled workers, each worker capacitated is practically irreplaceable, and (c) the casualty potentiality is high due to the fact that it has been necessary to employ on war work thousands of workers who have never worked with machinery or tools.



Staking Parts for Bomb Housing
Using a Press that Can Operate
Operated After Two Lever
One on Each Side of the
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Safety Device is Known as
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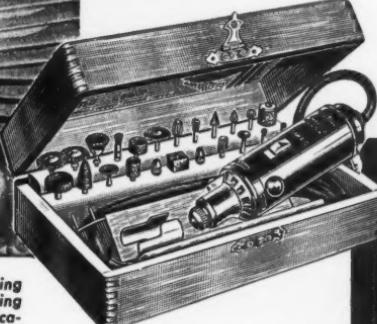
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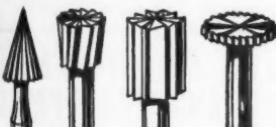


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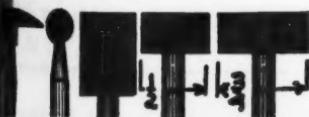
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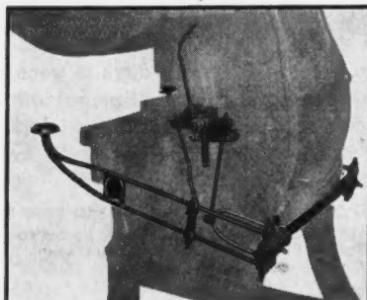
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be difficult for many of these workers to realize or remember that the corner or edge of a newly-machined surface may carry a burr that will cut like a knife, or that one shot of flying dust from a grinding wheel may blind an unprotected eye, or that an unprotected eye may cause blindness, or that a loose sleeve dangling over a shaft may cost the life of the wearer, or that the space between the ram and the table of a stamping press is always a danger zone unless a safety guard is provided to ensure that the operator's hands will be clear of the press before it can be operated.



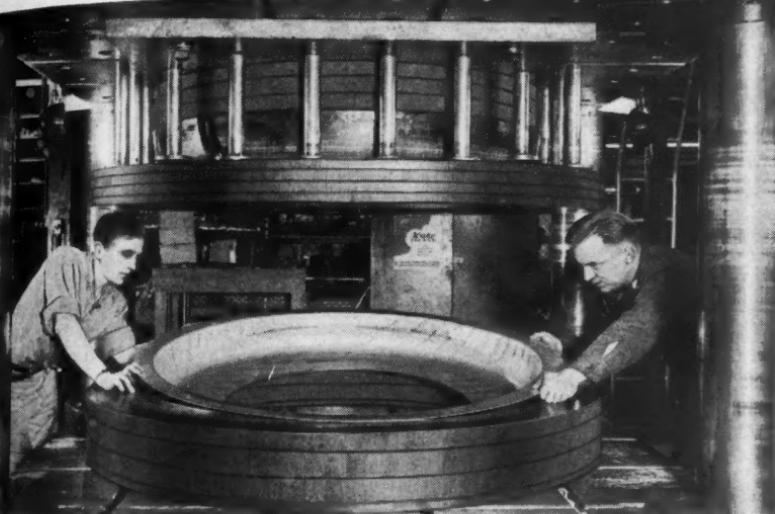
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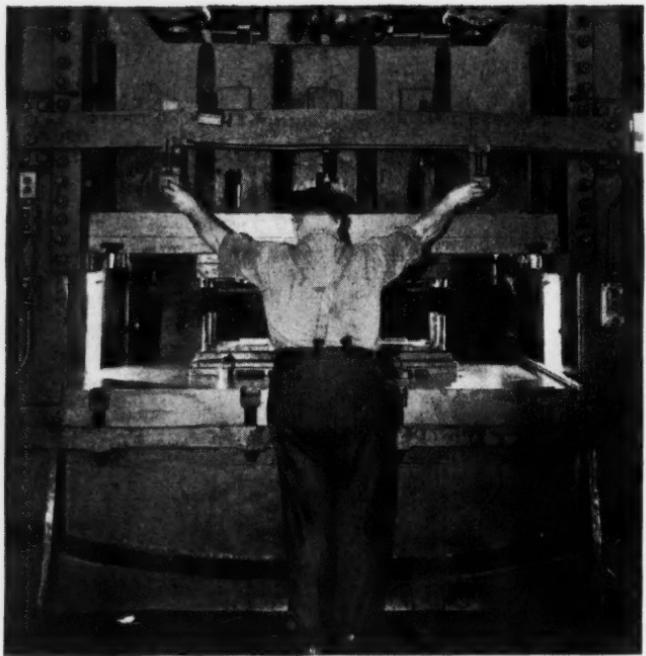
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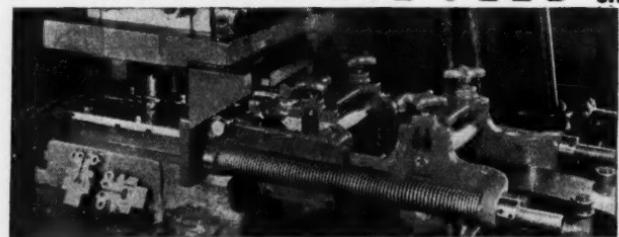
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Generally speaking, the best that can be done is to hold at least one safety meeting for each group of new employees, provide each new worker with a booklet of plant rules containing a set of safety instructions, and make sure that the job instructor makes a special point of any hazards that may be connected with the job and the proper method of avoiding them.

tors are provided with files and
structured to remove burrs from
and corners of machined surfaces;
all ladders are equipped with
points at the bottom ends so
they will not slip on smooth
that all power and light wires
properly guarded and insulated;
hammers and chisels with "no
room" heads are taken out of
ice until repaired, that cranes

DICKERMAN DIE FEED

FOR QUICK SET-UPS
SHORT OR LONG



Handles coiled stock of
practical thickness. Maximum
stock width 4". Adjustable
from 0 to maximum
feed length of 3" in increments of .001". Available

H. E. DICKERMAN
MFG. CO.

321 ALBANY ST.
SPRINGFIELD, MASS.

Fighting the BATTLE of PRODUCTION

MORE

**SOLDIERS
PILOTS
MARINES
MEN**

Calls for

MORE

**PLANES
SHIPS
GUNS
SUPPLIES**

Production of war materials has been speeded up, doubled and increased beyond peace time's wildest dreams . . . work hours have been lengthened, single working forces increased to two shifts, and in some cases to three shifts, seven days a week.

Machines are being operated many more hours and at a higher speed than ever before . . . several years of wear and depreciation are being crowded into one . . . machines are fighting the "Battle of Production" . . . and are proving themselves masters of the job . . . a tribute to their makers.

Many of these machines producing war materials are air operated and most air operated machines are equipped with Ross Air Control Valves . . . the valves that have been engineered and built to stand up under continuous use and adverse conditions.

Today all of us are in this battle up to our hilts; therefore, let's cooperate with each other. Let us share with you our experience gained through more than 16 years of concentrated efforts in the air control field . . . let us help you get maximum production out of your air-actuated machines and equipment . . . as true soldiers, let us cooperate with you in fighting this "Battle of Production."

ROSS Operating VALVE CO.
6484 EPWORTH BLVD - DETROIT, MICHIGAN



★ A SIZE AND TYPE FOR EVERY OPERATION ★



Levers on Either Sides of the Machine are Interlocked with Clutch Mechanism so the Press Cannot Operate until Levers are Pressed Down. Thus Ensuring that the Operator's Hands will be Clear of Danger Zone. The Large Zippers which can be Seen on Right Hand are Employed to Place the Work in the Machine.

ments that could be made to safeguard the operator. In a small shop this responsibility can be placed on the shop superintendent or department head; in a large shop it becomes the responsibility of the safety engineer. In either case will the

hoists are provided wherever the lifting of heavy workpieces may be necessary, that safety shoes are provided for stock handlers and warehouse men, and so on.

In addition, a periodic inspection should be made of each individual job to discover, if possible, any improve-



The 150-Ton Force Exerted by the Ram of this Press Would Comprise a Hazard if the Ram were not Properly Safeguarded. But the Press Will Not Operate until the Operator Releases a Specially-Designed Safety Lever with his Right Hand and then Swings a Starter Lever with his Left Hand.

METALITE CLOTH Gadgets SPEED SANDING

BETTER WORK IN A FRACTION OF THE TIME

SPIRALS: Metalite Cloth is used for many spiral jobs such as sanding the inside of holes, curved surfaces and curved corners. It is also used for sanding the top of curved surfaces and curved corners. It is also used for sanding the top of curved surfaces and curved corners.

SPIDERS: For many intricate shapes that are difficult to reach with standard abrasive tools, Metalite Cloth is the answer. It can be used for sanding the inside of holes, curved surfaces and curved corners. It is also used for sanding the top of curved surfaces and curved corners.

SPICEDGES: Metalite Cloth is used for many spicedge jobs such as sanding the inside of holes, curved surfaces and curved corners. It is also used for sanding the top of curved surfaces and curved corners.

SLOTTED DISCS: For all slotting jobs that are difficult to reach with standard abrasive tools, Metalite Cloth is the answer. It can be used for sanding the inside of holes, curved surfaces and curved corners. It is also used for sanding the top of curved surfaces and curved corners.

MUSHROOM PAD AND DISC: For all mushroom pad and disc jobs that are difficult to reach with standard abrasive tools, Metalite Cloth is the answer. It can be used for sanding the inside of holes, curved surfaces and curved corners. It is also used for sanding the top of curved surfaces and curved corners.

PENCILS: Metalite Cloth is used for many pencil jobs such as sanding the inside of holes, curved surfaces and curved corners. It is also used for sanding the top of curved surfaces and curved corners.

MARSHES: Metalite Cloth is used for many marshes jobs such as sanding the inside of holes, curved surfaces and curved corners. It is also used for sanding the top of curved surfaces and curved corners.

BRANCHES

A. B. Behr-Manning Company
St. L. Louis
Chicago
Cleveland
Milwaukee
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Philadelphia
Newark
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New York City

ASSURANCE OF CONVENIENT SERVICE

YOUR ASSURANCE OF
THEIR NAME
BEHR-MANNING
(DIVISION OF NORTON COMPANY)
TROY, N.Y.

DAULITY COATED ABRASIVES
SINCE 1919

**Every
Machine Shop**

**Every
Metal Finishing
Department**

**Should Have
This Wall Chart
IT'S FREE!**

Tool Engineers, Production Managers, Foremen, Workers on the line—every department interested in metal finishing should have this chart displayed so that all may know the many ingenious time-and-labor-saving forms in which Metalite Cloth is produced ready-to-use.

The left-hand column shows the many shapes; the right illustrates typical jobs; the center gives helpful information. Size: 11" x 18", Three Colors.

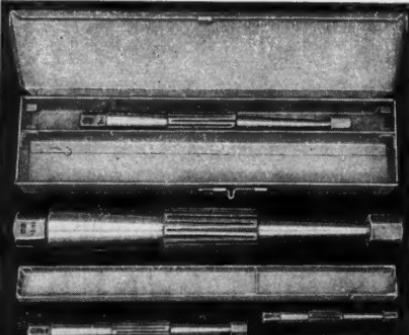
An inquiry on your letterhead will bring as many copies as you need

BEHR-MANNING
(DIVISION OF NORTON COMPANY)
TROY, N.Y.

be found difficult or expensive—not nearly so costly as a serious lost-time accident or casualty.

Where proper attention is given to the matter of safety, it is not impossible to maintain a good safety record even with an abnormally high percentage of green operators. During the first half of 1942 the Westinghouse East Pittsburgh Works cut the accident rate by 50 per cent over the previous year, despite an employ-

KNOCK-OUT EXPANDING MANDRELS



M101 Set has a range from $\frac{3}{8}$ " to $2\frac{1}{2}$ ".

No.	Range	Wt.	Price
M0	$\frac{3}{8}$ " to $\frac{1}{2}$ "	$\frac{1}{4}$	\$ 4.50
M1	$\frac{1}{2}$ " to $\frac{1}{4}$ "	$\frac{3}{8}$	5.75
M2	$\frac{1}{4}$ " to 1"	1	7.75
M3	1" to $1\frac{1}{4}$ "	$2\frac{3}{4}$	12.00
M4	$1\frac{1}{4}$ " to $2\frac{1}{2}$ "	9"	22.00
M5B	$2\frac{1}{2}$ " to $3\frac{1}{4}$ "	$17\frac{1}{4}$	44.50
M5C	$3\frac{1}{4}$ " to 4"	$30\frac{1}{4}$	44.00
M55	$3\frac{1}{4}$ " to $4\frac{3}{4}$ "	$42\frac{1}{4}$	89.00
M6B	4" to $4\frac{3}{4}$ "	38	70.00
M6C	$4\frac{3}{4}$ " to $5\frac{1}{2}$ "	53	76.00
M5	$2\frac{1}{2}$ " to 4"	$42\frac{1}{2}$	68.50
M6	4" to $5\frac{1}{2}$ "	78	100.00

Good delivery of some sizes from stock.

Write or wire for bulletin M42-2M

K. O. Lee Company
Aberdeen, South Dakota

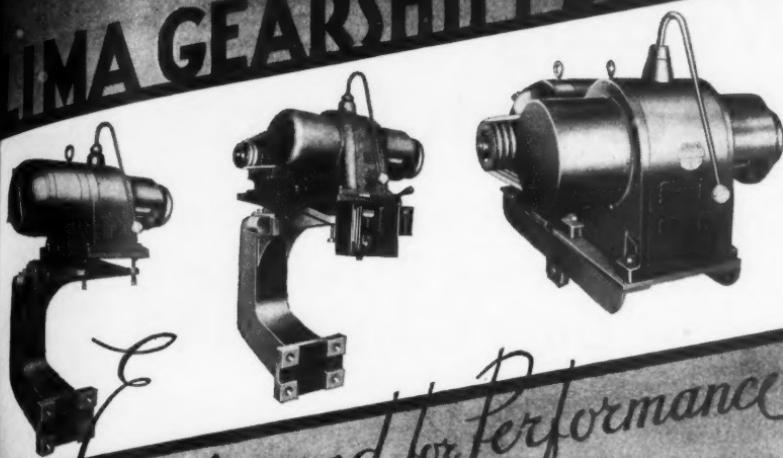


An Air-Blast, Controlled by a Foot Valve Frequently Used in the Shop to Blow Chip Shavings from Workpieces After They Have Been Machined. Here an Air Conduit is Equipped with a Glass Guard which Protects the Worker's Eyes from Flying Chips.

ment increase of 21 per cent. To a large extent this excellent record can be credited to intelligent analysis of the individual manufacturing operations from the safety standpoint, the use of guards and other devices designed to safeguard the workers.

Inasmuch as stamping presses appear to be especially hazardous to new operators, special attention has been given to the development and use of devices which make it practically impossible for a press operator to trip the press while his hands are in the danger zone, as described in the article presented above.

LIMA GEARSHIFT DRIVES



Engineered for Performance

They are engineered for fast, precision production and to increase operator efficiency and accuracy. That is why LIMA Gearshift Drives are playing such an important part in machine tool and production equipment operations today.

Let us tell you how LIMA Gearshift Drives will increase your production. Wire or write us for address of Lima Engineering Service nearest you.

★ Buy War Bonds for Quick Victory ★



Large enough to successfully serve you, yet small enough to give personal attention to your needs.

EXP. PROOF

THE LIMA ELECTRIC MOTOR CO.

EXPLOSION - PROOF

1 to 5 HP

OFFICES - NEW YORK - CHICAGO - DETROIT

U. S. A.

LIMA, O.

POLISHING LATHES

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VERTICAL

TOTALLY-ENCLOSED



Welding Award Study of Gun Carriage

Change in Construction Method Increases Strength 50% Cuts Cost \$171.43

SHOWN here is the 40 mm. Bofors anti-aircraft gun, the carriage of which was redesigned from riveted to welded construction and described in a paper which won the author, Dr. J. L. Miller, chief metallurgist, Gun-Mount Division, The Firestone Tire and Rubber Company, Akron, Ohio, the Second Grand Award of \$11,200 in the 2½-year \$200,000 welding study program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

The chassis and outrigger supports were redesigned with high-strength low-alloy steels and although only 30 per cent more weight was added, strength was increased 50 per cent. Cost per chassis was \$76.80 less than riveted construction.

The top carriage, which carries the gun, was redesigned for welding with a net saving of 17 pounds as compared with riveted construction of equal strength. Appearance was improved and cost was reduced \$10.37, excluding overhead or profit. Design involving tubes and cast steel ends joined by welding saved about \$68 per axle.

A number of other smaller parts were also redesigned to be welded.

The total saving estimated at \$171.43 per carriage. While secondary in a military program, important factor is the increase in production and the improvement in the performance of the final product.

Dr. Miller, until 1½ years ago associate Professor of metallurgy at Illinois Institute of Technology, is a graduate of Harvard University and is a member of The American Society for Metals.

The Lincoln Foundation \$200,000 Progress Award Program, results of which were announced in October, showed a possible annual cost savings of \$1,825,000,000 including 7,000 tons of steel valued at \$271,000 and 153,000,000 man hours of labor available by utilization of arc welding.

Papers were submitted from all the 48 states by engineers, designers, architects, maintenance men and executives throughout the industrial field. Altogether, 408 awards were made to 458 recipients, the different papers covering joint authorship. Awards embraced 46 divisions of participation, which encompassed the entire industrial field.

The great mass of important



On any surface...on any war job
SKILSAW
SANDERS and GRINDERS
GIVE YOU
Finer Finishing Faster!

SKILSAW PORTABLE GRINDERS

Grind down raised welds faster. Light, compact, powerful. Perfectly balanced for easiest day-long operation. 2 MODELS.

• Have you welds to grind . . . metals to clean . . . "final-finishing" to apply on wood or brass or steel? You can do each job better and faster with one of these SKILSAW TOOLS! They're specially designed for easier handling. They're skilfully engineered for greater output per man at war-time production speeds. They're ruggedly built to stand the gaff of highest 3-shift operation without time-wasting breakdowns.

Do you wonder why these SKILSAW SANDERS and GRINDERS are favorites everywhere for coarsest grinding or finest buffing. Ask your distributor for a demonstration and signee for yourself!

SKILSAW, INC., 5037 Elston Ave., Chicago

New York • Boston • Buffalo • Philadelphia • Cleveland • Detroit
Indianapolis • St. Louis • Kansas City • Atlanta • New Orleans
Dallas • Los Angeles • Oakland • Portland • Seattle • Toronto, Can.

SKILSAW PORTABLE ELECTRIC **TOOLS**

* MAKE AMERICA'S HANDS MORE PRODUCTIVE *



SKILSAW DISC SANDERS

Speed up all metal cleaning, sanding, filing, grinding with wire brushes (illustrated) cup wheels, polishing pads, etc. 6 MODELS.



SKILSAW BELT SANDERS

Produce a smoother, better "final finish" 10 times faster than by hand . . . on wood, metals, plastic compositions. 4 MODELS.

Bofors Anti-Aircraft
Gun of Welded
Construction



welding data contained in the papers will be made available as soon as possible for the benefit of war indus-

tries—in the form of articles in trade publications and other magazines and eventually in book form.

This was done at the conclusion of the last Foundation study in 1937-38, and resulted in the dissemination of information which became vital to the nation's war production.

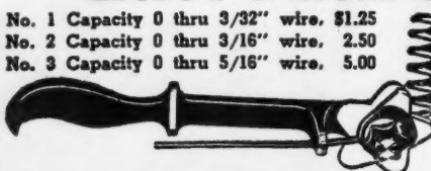
The foundation was founded in 1936 in honor of James F. Lincoln, President of The Lincoln Electric Company, Cleveland, by the company's board of directors.

Hardinge Master Feed Fingers with Adjustable Tension. Illustrated, descriptive, and tabular information on Hardinge Master Feed Fingers with Adjustable Tension for handling all types of screw machine materials is contained in a bulletin now available from Hardinge Brothers, Inc., Elmira, N. Y., free upon request.

B-C Data Sheets No. 43 and 44. "The Governor Pinions Hobbed in 20 Minutes" and "Production—120 Gears Per Hour on 4 Machines" are the titles of two performance data sheets on B-C Hobbing Machines issued by the Barth Colman Co., 207 Loomis St., Rockford, Ill. Copy of Data Sheets Nos. 43 and 44 free upon request.

Here's a Real Spring Winder!

- No. 1 Capacity 0 thru 3/32" wire. \$1.25
No. 2 Capacity 0 thru 3/16" wire. 2.50
No. 3 Capacity 0 thru 5/16" wire. 5.00



WILL EARN ITS COST IN ONE MONTH.
The HJORTH Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try us in your shop. You'll like it and the price is reasonable.

HJORTH LATHE & TOOL CO.

12 BEACON STREET
WOBURN, MASS.

When did you CHECK your **ELECTRIC MOTOR BEARINGS?**

Most bearing failures are due either to improper fit or neglect. Proper care and attention will enable you to secure many additional hours of excellent service. In times like the present, it's a manufacturer's duty to keep every machine running at full capacity.

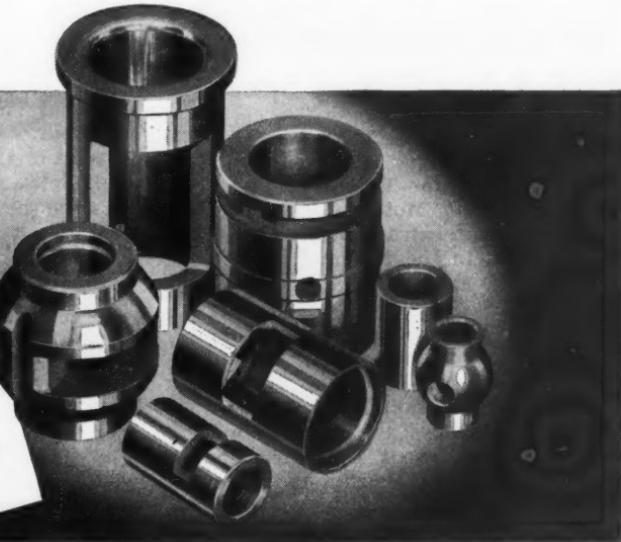
Few parts carry the same responsibility as bearings. Why not follow these easy steps to insure the maximum service from each one? Adopt a regular period of inspection. Make certain that every bearing is in perfect alignment. Keep them clean.

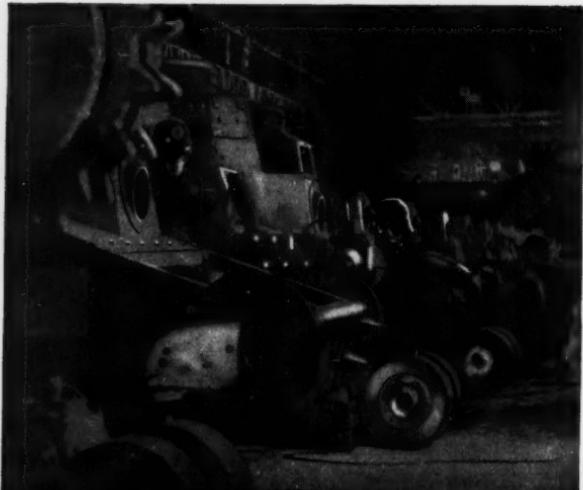
Take steps to avoid foreign matter of a gritty or abrasive nature from reaching the bearing. Lubricate at regular periods depending on the operating schedule. Make certain the lubrication is the correct grade and that it is clean.

If you will follow these instructions, you will find that Johnson sleeve type bearings will usually outlast the unit in which they are installed. Johnson Bronze Company, 590 South Mill Street, New Castle, Penna.

Replace

Manufacturers of armament can secure replacement bearings with a minimum of delay. Write for our new catalogue. It's free.





THIS IS A JAP WAR FACTORY

It's their output against ours.
American labor and management—working together—
can and WILL beat them!

Buick Salvages High Speed Steel

IN order to avoid waste of high speed steel, the Buick Motor Division, General Motor Corporation, has developed a salvage system which has resulted in the reclamation of a considerable amount of this critical material.

When a high speed steel turning tool is worn down to such a point that it is too short for further use on the lathe, an attempt is made to use it on a job where a short tool will suffice. In any event, eventually the tool becomes too short for further use.

This short high speed steel stub is

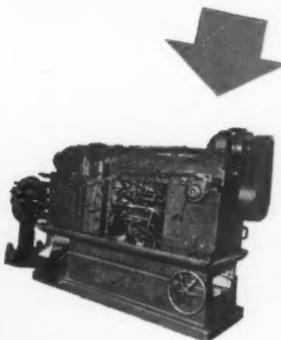
"Think American"

The poster shown on this page is the second of the series that has been reproduced in this journal. Identified by the label "Think American," the series was brought out by Kelly-Read Company, Rochester, N.Y., in response to a request by a group of business and industrial executives. The posters are in color, and are 20 x 27 inches in size. They are available from the firm mentioned above.

now sent to a central tool salvage where it is added to the growing stock of high speed steel of the same size, the different sizes being segregated. The scrap ends are then sent to the toolroom, where they are forged into longer pieces of smaller cross section. For instance, a scrap end of a piece of $\frac{5}{8}$ x $1\frac{1}{4}$ -inch steel is forged to make a tool $\frac{1}{2}$ -inch square which in all probability will be as long as a new toolbit of the $\frac{1}{2}$ -inch square size. These toolbits are placed in stock to be issued as new tools.

The use of this method ensures that no high speed steel goes into the scrap until it is too small to be re-forged for further use. The only requirement for this system is the ability to forge high speed steel without checking or seaming.

Your Life Insurance won't be worth a nickel if we lose this war. Buy Freedom Insurance too — Victory Bonds!



No pause need refresh them

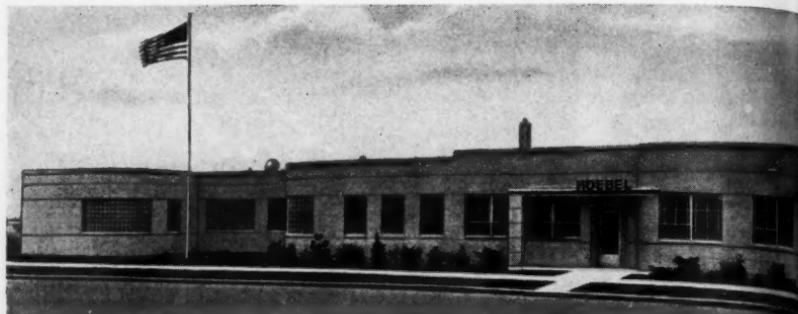
When time, space and manpower are precious, the tireless performance of fast, dependable multiple spindle automatics is appreciated.

Although machines may not tire, their operators often do. Simplicity and convenience of operation are important factors of a good machine. The Departmental Design of a Conomatic contributes much to its efficiency and ease of operation. The tooling area, work-head, overhead camshaft, and controls, are in orderly arranged units, conveniently accessible from either side of the machine.

These conveniences contribute to the effective results that good operators are getting from 4, 6 and 8 Spindle Conomatics.

Prime your production pulse by specifying CONES.
Cone Automatic Machine Co., Inc., Windsor, Vermont





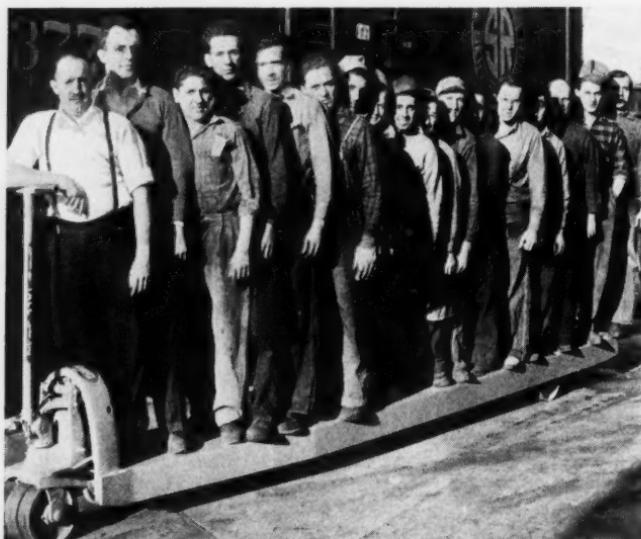
New Plant for Koebel Diamond Tool Company

For the second time in two years, the Koebel Diamond Tool Company, Detroit, found it necessary to move to larger quarters due to an increase in production. The company is now located at 9456 Grinnell Ave., just three doors from its former plant. The new building is designed to include more than twice the floor space of the previously occupied building so as to enable additional machines together with a larger working force to be employed.

The Koebel Diamond Tool Company manufactures a wide variety of diamond dressing, boring, and precision tools for every industrial purpose, which are marketed under the trade name of Koebelite.

Another "World's Largest"

Just delivered to Johns-Manville & Sons is this "World's Largest"—or longest



est—hand lift truck, product of The L & Towne Manufacturing Company. The truck is 168 inches long, and is built strong enough and long enough to support 17 men. Designed to handle wall board or roofing, this truck is a special adaptation of the Load King Hydraulic Model. All operating parts are standard L & Towne design.

R
G

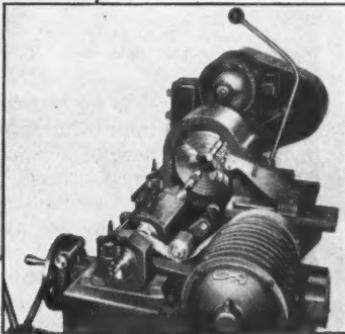
finds hole deep, s under rang possible or constructe

ns, deliv
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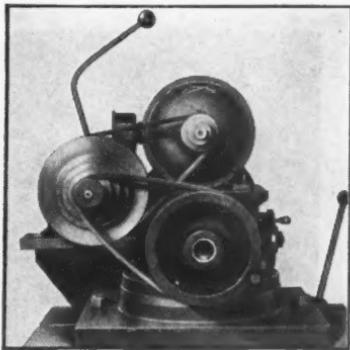
Buy Bonds to War
Bombs to Blot Out
Axis. Every bond
represents money
saved—an investment
that will pay you interest.



Angle view, work in chuck.
Headstock graduated through 180 degree.



Looking down, from grinder head end.



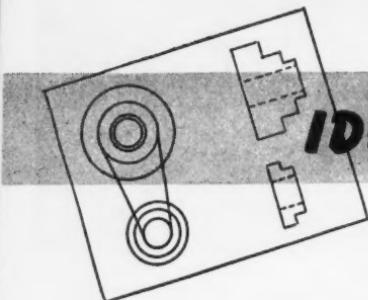
View from headstock end, guard removed,
showing step pulleys providing various
speeds of work head. Headstock may be
slid crosswise any distance up to 6".

Sav-way MULTI-PURPOSE **INTERNAL GRINDER**

inds holes $\frac{1}{4}$ to 18" diameter . . holes up to
deep, straight or tapered. Will handle a
wide range of work than has heretofore been
possible on any one model machine . . sturdily
constructed throughout . . complete specifica-
tions, delivery and price on request.

Representatives throughout the U. S. A.

Sav-way INDUSTRIES
Machine Tool Division
4869 EAST EIGHT MILE • DETROIT, MICHIGAN



IDEAS FROM READERS

Chuck Maintains Roundness of Work

By C. T. PACKER

Westinghouse Electric & Mfg. Co., Lima, Ohio

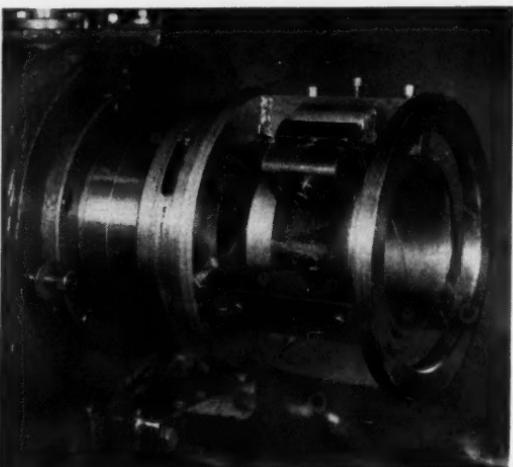
DIFFICULTY is sometimes experienced in maintaining roundness in the finished bore of a piece of work due to the holding methods that were employed in the previous operation, and this condition is aggravated where the workpiece is odd-shaped or out of round on the outside.

To overcome this difficulty, a chuck was developed whereby three entering and supporting arms are bored to the size of the finish diameter of the

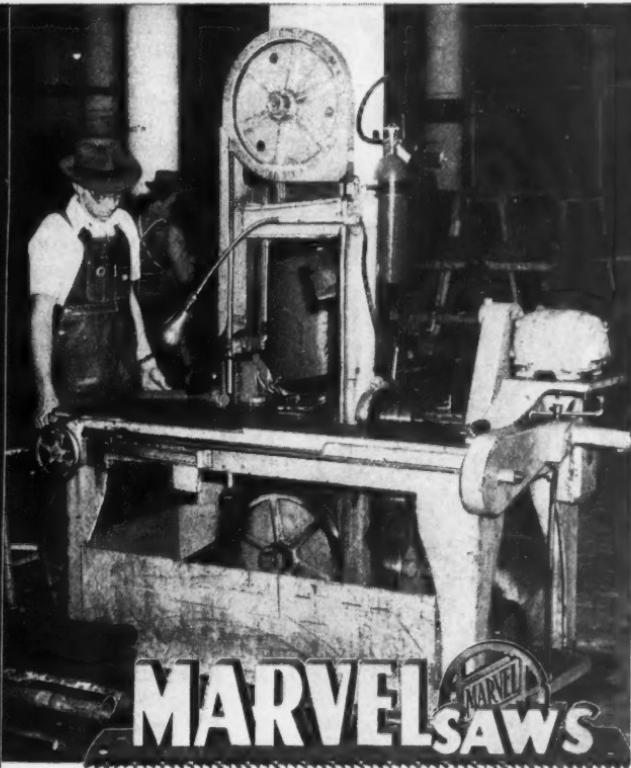
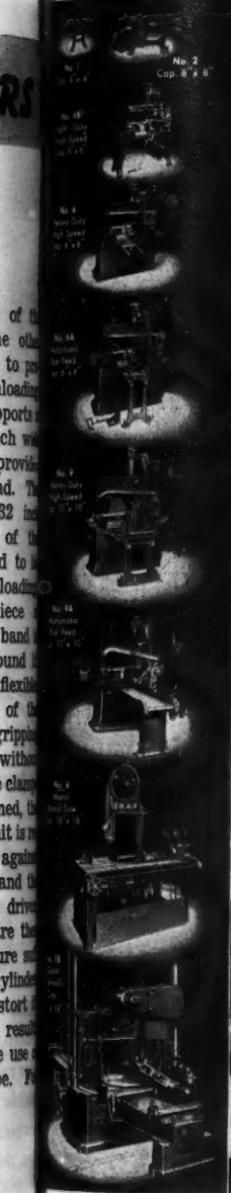
bore in the workpiece, two of the supports being fixed and the other provided with release screws to provide for easy loading and unloading. Into the face of the three supports is fitted a $\frac{1}{8}$ -inch thick by 3-inch wide spring steel band that is provided with clamp lugs at each end. The groove for the band is $1/32$ inch deeper than the thickness of the band, which permits the band to be in the clear for loading or unloading.

In operation, the workpiece is placed in the chuck and the band is clamped tightly in place around it. Since the spring steel band is flexible, it conforms to the contour of the cylinder but has sufficient gripping power to drive the workpiece without distorting it. After the clamp band has been tightened, the clamp and cylinder unit is rotated until it stops again against one of the supports and the support serves as a driver. The release screws are then tightened with pressure sufficient to hold the cylinder but not enough to distort it.

Very satisfactory results are obtained from the use of a chuck of this type.



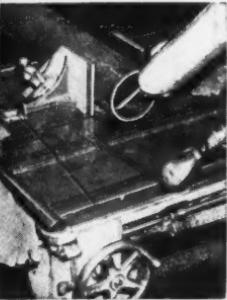
The Special Chuck Shown Below Eliminates Distortion When Holding Cylinders for Machining



MARVEL SAWS

at Vultee Aircraft

--- "cuts can be made that are not obtainable on any other saw!"



At Vultee Aircraft, Inc., this MARVEL No. 8 "has a very wide use" and "has proved a very efficient machine," for it is in continuous use sawing Pipe—all diameters; Bar stock—both machine stock and tool steel; Structural steel—angles and shapes and Steel Plate. What other saw could make the angle cut illustrated in the close-up but the universal MARVEL No. 8 Metal-cutting Band Saw on which the blade feeds into the work at any angle from 45 deg. right to 45 deg. left!

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

January, 1943

5700 BLOOMINGDALE AVENUE
CHICAGO, U. S. A.
Eastern Sales Office: 225 Lafayette St., New York

BURKE MILLING MACHINES



No. 4 Motor Driven MILLING MACHINE
Mounted on Cabinet Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

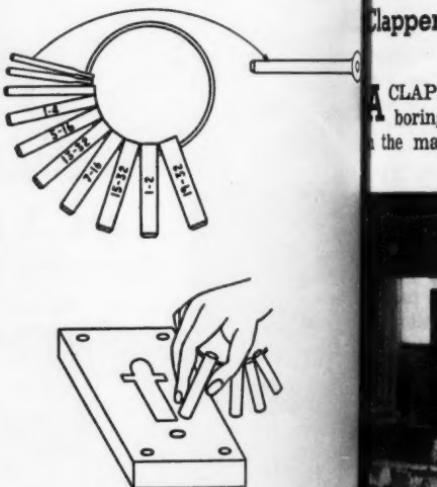
BURKE MACHINE TOOL CO.
297 E. 16th St.
Conneaut, Ohio

example: A cylinder 6 inches diameter by 6 inches long is to be turned and bored inside to 5 inches plus or minus 0.001 inch. The usual procedure is to use a three-jaw chuck to hold the piece, and in most cases the pressure necessary on the chuck-jaws to drive the work is sufficient to distort the piece so that it will be 0.006 to 0.006 inch out-of-round on either the O.D. or the bore after it has been removed from the chuck. Usually this distortion carries through to the finished product.

Hole Sizing Gages

By C. H. WILLEY

EVERY experienced machinist and toolmaker has had the experience of trying to determine the size of a small hole by the use of the shan-



Hole-Sizing Gages Made from Drill Rod for
Finding Sizes of Small Holes

of a straight shank drill. So far the writer has been able to find out there are no gages for this purpose on the market. However, it often hap-

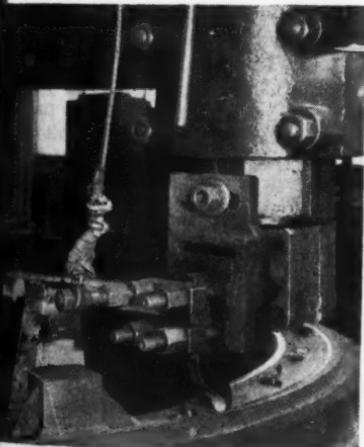
...diameters that the shank of the drill is
...tured enough from being "chewed" in a drill
...plus a chuck, in which case it is of no value
...l process to a gage. Accordingly the idea pre-
...as the
...ck-jaw
...to do
...be 0.001
...n either
...as been
...ally the
...the fin-
...others as it has to me.

The writer obtained a complete set
of short pieces of drill rod and cut
them all to the same length. Then
small holes were drilled through the
pieces at an even distance from one
end so that they could be strung on
a wire for convenience in handling,
as shown in the illustration, and the
size of each piece was stamped on it.
The very small pieces were hammered
flat near one end for stamping.

With such a set of gages it is un-
necessary to depend upon the avail-
ability of a set of drills to gage small
holes.

Clapper Box on Boring Mill Saves Time

A CLAPPER BOX on a vertical
boring mill is saving five hours
in the machining of a 60-inch ring



Close-up of clapper box with tool in cutting position.

for a large unit of ordnance equipment
being manufactured at one of the General Electric Company's
Works.

Although the application of a clap-
per box to other types of machines
such as planers and horizontal mill-
ers is common, the use of the hinged
tool-holder on a vertical boring mill
is unique. The method of application
was suggested by E. M. Reamy, a

NEW TIME SAVER FOR BUSY WAR PLANTS

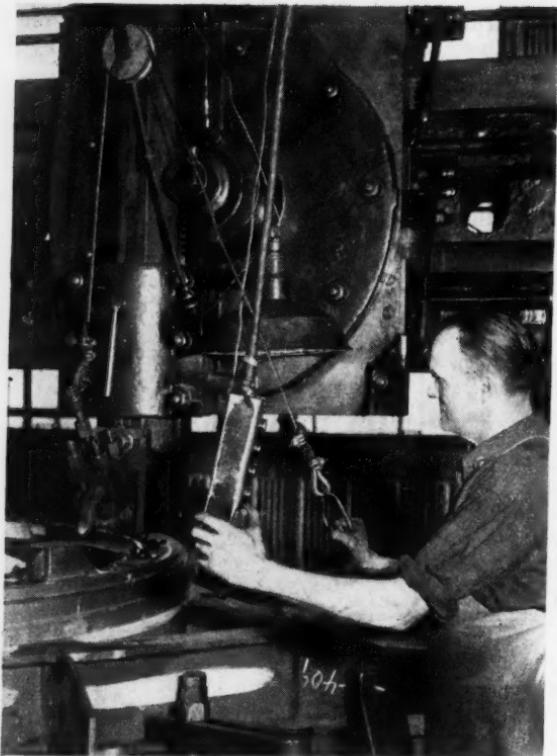


DUPLEX M-6 BAND and DISC GRINDER

- 14" steel disc and ample grinding table for rough work.
- 6 x 48" abrasive band for perfect, straight grain finishing on metals, plastics, wood, fibre. 7 3/4" x 14" grinding table.
- 1/4 H. P. motor — fully enclosed V-belt driven.
- Ball bearing throughout — Alemite lubricating system.
- All-around economy for plants of all sizes.

Other styles and sizes in
New Booklet on Finishing — Write Today

WALLS SALES CORP.
96 Warren St., New York, N. Y.



E. M. Reamy shown operating the clapper box on a vertical boring mill. Tool is raised by pulley arrangement shown. Push-button station operator instant control movement of table.

machine operator with the company since 1918, who has 43 other adopted suggestions to his credit.

Reamy received a cash award for his idea, which is as simple as it is effective. The 60-inch ring has two

six-inch-high lugs opposite each other. The old method of doing the job was to stop the table around to raise the head, run past the lower the head, and start the machine again.

Use of the clapper box simplifies the operation. Pulley arrangement enables the operator to raise the tool easily to clear the lugs, and there is no need to stop the machine. When the cutter is in the down position it is held in place by the pressure of the cut. Experiments have shown that there is a safety hazard if the operator should fail to raise the tool in time to clear the lug; the only damage is a broken tool. However, clearance is provided on the piece to give the operator time to get the tool out of the way.

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This very
riveting...
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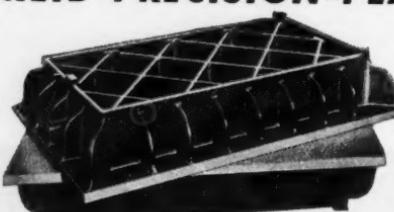
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REID PRECISION-PLANED SURFACE PLATES



Accuracy guaranteed on 12" x 18" size within .0005". On 36" x 72" within .0015".

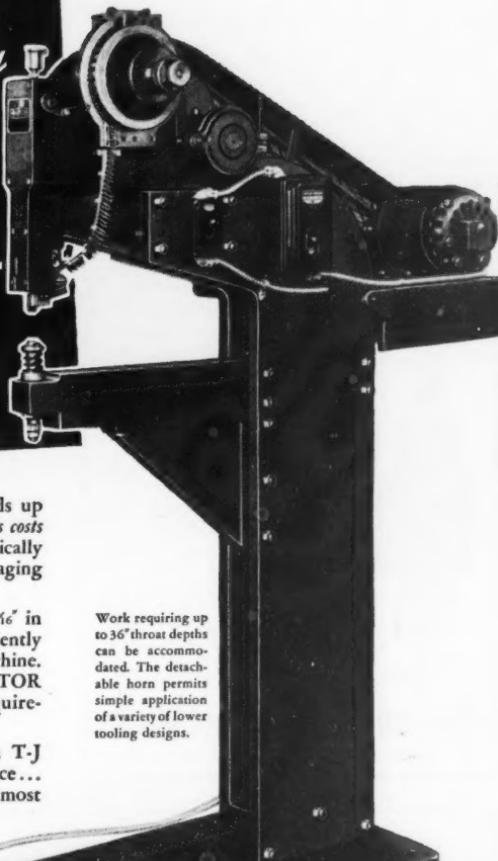
Thoroughly normalized and weather seasoned Reid Precision-Planed Surface Plates have proved thoroughly satisfactory on work to close limits.

Excellent delivery—Write for prices—details.

Tool Engineering Service Co., Inc.
241 Washington Ave. Nutley, N. J.

600 PER HOUR

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FEEDS AND SETS
 $\frac{1}{4}$ " DIAMETER
**SOLID STEEL
RIVETS**



This versatile "RS" RIVITOR speeds up riveting...does a better job...and cuts costs for many industries today! It automatically feeds and sets rivets at rates averaging 1600 per hour!

Solid rivets ranging from $\frac{1}{8}$ " to $\frac{1}{16}$ " in diameter are handled rapidly and efficiently (with different tooling) by this machine. Thus, the Tomkins-Johnson RIVITOR offers greater capacity...meets requirements of a greater number of jobs.

Ruggedly built...designed with T-J know-how based on long experience...this RIVITOR meets demands for utmost dependability and long life. Write today for bulletin R-4. The Tomkins-Johnson Co., Jackson, Michigan.

Work requiring up to 36" throat depths can be accommodated. The detachable horn permits simple application of a variety of lower tooling designs.

TOUGH JOBS...SPECIFY



TOMKINS-JOHNSON RIVITORS

Muffler for Shop Telephone

By A. H. WAYCHOFF

TELEPHONES are necessary in the machine shop, but in many cases the advantage of the phone is nullified by the noise coming from adjacent machines.

In a certain noisy shop with which the writer is familiar a very simple method of keeping the noise away

from the phone has been discovered. A box-like hood has been set up over the phone, as shown in the illustration, the hood being large enough to accommodate a man's head and



Courtesy Internat

DORMAN TAPPERS

Friction Drive and Positive Drive...Automatic Reverse

Prompt Delivery On All Sizes

No. 1 Taper drives smallest tap in softest material to $\frac{3}{8}$ " tap in steel. Simple adjustment changes light friction to positive drive or any intermediate stage.

No. 2 Tapper drives from $\frac{3}{8}$ " to $\frac{3}{4}$ ".

No. 3 Tapper Drives from $\frac{1}{2}$ " to 1" in steel or other material.

Floating Chuck Jaw automatically centers tap.

Write for details.



Dorman Machine Tool Works

357 CANAL ST.

NEW YORK, N. Y.

Muffler for Shop Telephone

arm and shoulder. And the hood consists simply of an ordinary corrugated paper shipping carton. The corrugated paper is, itself, a noise dener, and inside the box one can talk the phone without difficulty.

No front closure is necessary; the body of the person using the phone will practically fill the opening. If necessary, a piece can be cut out of the side to accommodate the user's hand for making notes on a pad.

HINGES

VARIOUS WIDTHS
and GAUGES



BUTTS AND ■
CONTINUOUS LENGTHS

WRITE FOR PRICES

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CABINETS
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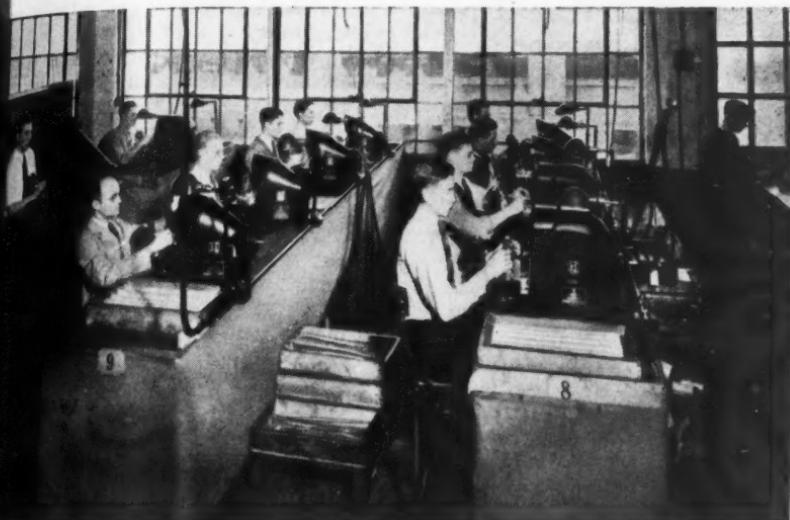
S & S MACHINE WORKS

4541 W. LAKE STREET HARDWARE DIVISION CHICAGO, ILLINOIS



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Jones & Lamson Comparators are available in Pedestal, Bench and other types to meet every need in the field of Inspection by Optical Projection. We shall be pleased to study your problems and apply to them the accumulated experience of more than twenty years in this field.



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Thread Grinders · Optical Comparators · Automatic
Opening Threading Dies and Chasers.

Thread-Cutting "Tip"— Discussion

Editor, MODERN MACHINE SHOP,
Dear Sir:

I read the article in your December number relative to cutting threads on a lathe without a dial.

From my experience in cutting threads in this manner, the proper steps are to measure off a distance in equal inches to a given pitch. As an illustration: if you were to cut a $2\frac{1}{4}$ pitch, the distance would be 9 inches. In this instance you would start the lathe with the carriage at a given point and let it travel 9 inches, then stop the lathe at that point, open the half nut, bring the carriage back to the original mark, throw in the half nut, and proceed as at first.

In this way the thread will catch each time, but this cannot be done by simply marking a chalk mark on

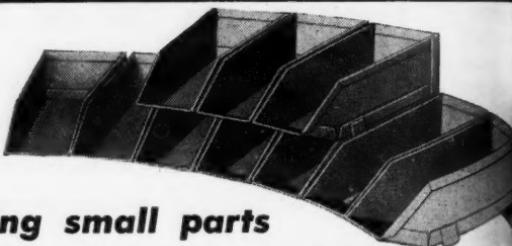
the leadscrew, as the ratio in instances is such that you will have to complete a certain number of revolutions to bring the chalk mark into proper relation to the given pitch. The chalk mark may be all right for even pitches, but any lathe will cut a thread in even inches; that is, a multiple of the lead screw.

We had a case where we had to cut a 3-lead screw; one thread was 18 inches. No dial would take care of this. The workpiece was about 15 inches long, and the thread was 18 inches apart. I set the tool about $\frac{1}{4}$ inch past the end of the workpiece and stopped the lathe just past the chuck. Inasmuch as the workpiece was 15 inches long, I had to come out to clear the work at the opposite end, so I measured off 18 inches, which is a multiple of 3, and marked it.

Then having put a mark at the starting point, I threw the half nut in and fed the tool the 18 inch

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Floors slope to feed parts to front — end reaching and fumbling.

All-welded construction.
Rolled, smooth edges.

Bins taper toward front to form convenient semi-circle —keep all bins within easy reach.

Nesting, locking construction for rigid set-ups, easily changed when necessary.

Two sizes—tapered or straight edges.
Hoppers available for steady work.

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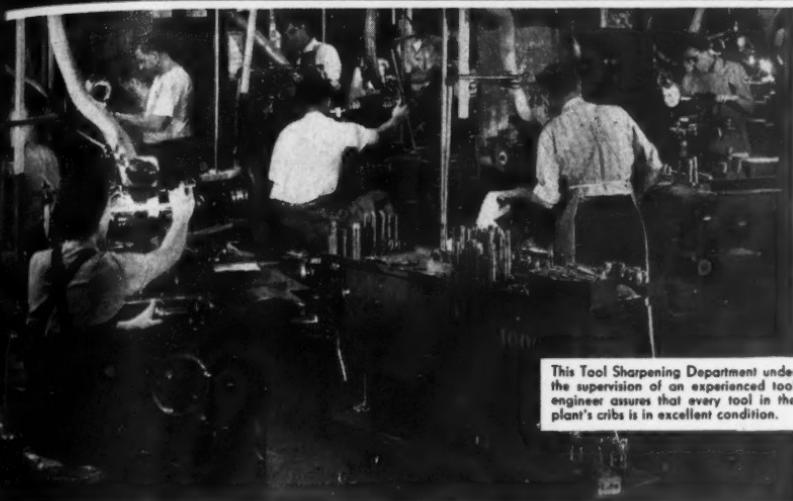
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Still Accessible™

Tool Conservation begins in the Tool Crib



This Tool Sharpening Department under the supervision of an experienced tool engineer assures that every tool in the plant's cribs is in excellent condition.

GET ALL THE Good OUT OF Good Taps



This grinder located in a tool crib of a large aircraft engine plant is used for emergency sharpening and "touch-up" jobs.

For helpful information on how to keep taps at peak efficiency, send for "Greenfield's" new booklet, "How To Sharpen A Tap."

Maintenance of tools in proper working condition multiplies their life many times. Even those which have become badly worn, rusted or chipped — that seem to have outlived their usefulness — may often be salvaged to give valuable additional service.

Many large plants maintain separate tool sharpening and salvage departments. But the small shop or departmental tool crib may easily do an outstanding job if equipped with a small grinder and a few attachments.

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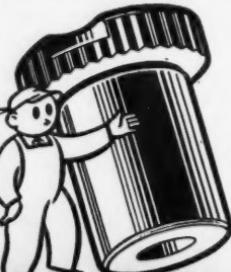
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**UNIVERSAL
ENGINEERING COMPANY
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tance. At this point I stopped lathe, opened the half nut, brought the carriage back to starting point. This I repeated, the question was raised as to how could catch the other two threads since the thread was a three-thread. As it was in three parts in equal inches, I allowed the carriage to travel one inch beyond 18-inch mark. Then I stopped lathe, brought the carriage back to the original starting point, and wound the next thread the same as first. To catch the third thread I allowed the carriage to over-run 18-inch mark by one inch again, stopped the lathe, brought the carriage back to the original mark again, proceeded as at first, completing the screw with one thread in three inches.

Very truly yours,
(Signed) FRED KNOEDLER

**Thread-Cutting "Tip"-
Discussion**

Editor, MODERN MACHINE SHOP,
Dear Sir:

I read the article "Thread-Cutting Tip" on page 220 of your December issue, about cutting threads on a lathe without a dial. When cutting a thread that is not divisible by the leadscrew, the method would not work, and if the thread is divisible by the lead screw, no dial or method is needed because you can't miss.

When cutting a 7-pitch thread on a 4-pitch leadscrew you are likely to hit the thread about once in four times; in cutting a 6-pitch thread you would likely hit it about half the time.

I learned thread cutting from a mechanic of the old school—my father—and he taught me a method that I have used many times successfully. The method is similar to the one mentioned, with the addition that

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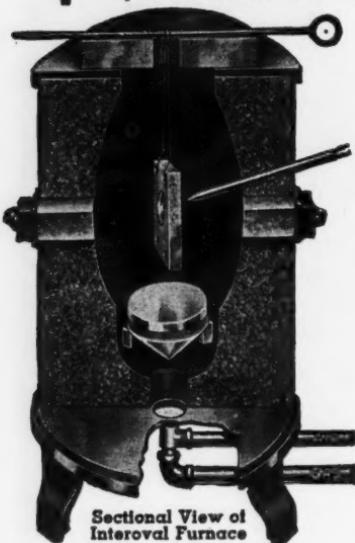
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Sectional View of
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No possibility of surface decarburization or distortion. Heat treats "Moly" steels without any trace of scale or soft skin.

This gas-fired furnace operates at 25c per hour for fuel. Heats to 2350° F. in 40 minutes in a non-oxidizing atmosphere. May be quickly converted into lead, cyanide or soft bath furnace.

Heating chamber—14" high, 9" in dia. at center, 7" at top.

WRITE FOR NEW FOLDER.

BENNETT
INSURED STEEL TREATING CO.
130 SOUTH ST. NEWARK, N. J.

is also necessary to mark the work the same as the leadscrew. After a cut had been taken down the thread the carriage is returned to the stop and the mark on the work must be positioned as well as the mark on the leadscrew before engaging the carriage.

A variation of this trick consists in clamping a steel scale on the work with the end of the scale even with the end of the carriage. Starting with the carriage at the stop and engaging with the end of the scale, a cut is taken on the thread and the carriage is stopped at any one of the scale marks. The carriage is then disengaged and run back to the stop where the nut is engaged for the next cut. However, in cutting an 11/2 pitch (pipe) thread, the carriage is stopped only at every other scale mark, or every two inches. With this method it is not necessary to move the work or the leadscrew.

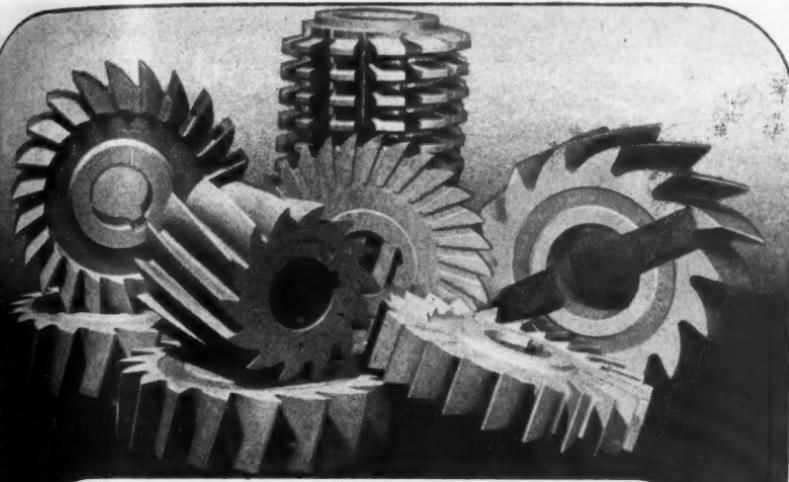
Yours truly,
(Signed) S. T. ECHOLAN

Methods of Fabricating "Lucite"
methyl methacrylate resin into aircraft enclosures and other products are described in detail in the new illustrated manual on "Lucite" for Aircraft made by the Plastics Department of E. I. du Pont de Nemours & Company.

Information on the care and handling, sawing, blanking and punching, drilling, threading and tapping, routing and shaping, sanding, scraping, finishing, cleaning, cementing, forming, mounting and installation, and repairing of "Lucite" is contained in the manual.

Together with pictures and diagrams illustrating these various operations the manual has a complete listing of the mechanical, thermal, optical, electrical and general properties of the plastic.

Copies of the manual will be sent to the Plastics Department of the E. I. du Pont Company at Arlington, N. J., to executives, business men and engineers who request it on their business letter heads.



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● Perfection is the all-important factor in today's speed-production of Aircraft and other Defense material—and that Perfection is inherent in all UNION TOOLS.

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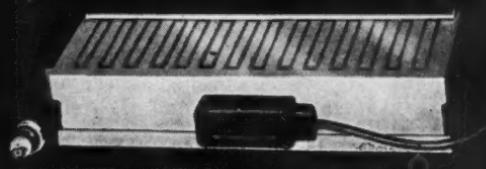
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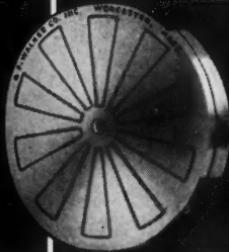


Walker presents a complete line of Magnetic Chucks for modern equipment . . . Rectangular, Swiveling and Rotary Types in all sizes.

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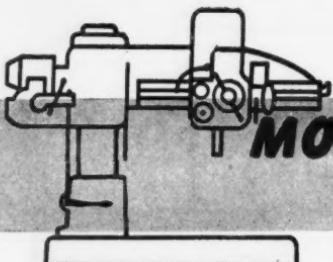
Also belt or motor-driven DC and portable AC Demagnetizers.

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O. S. WALKER CO., INC.
WORCESTER, MASS.

• U. S. A.



MODERN EQUIPMENT AT WORK

Ice-Cold Rivets!

TRICYCLE ice cream wagons to transport rivets is the newest wrinkle at the Consolidated Aircraft Corporation's huge plant near San Diego, California. Four of these traveling ice boxes have been purchased by this company to whisk about the mammoth factory and dish out cold rivets for use in assembling various parts to B-24 Liberator Bombers and



Frozen Rivets, Instead of Ice Cream Cones, are Transported in these Tricycles from the Refrigerators to the Various Riveting Stations Throughout the Huge Consolidated Aircraft Company's Factory

PBY Flying Boats.

When aluminum alloy rivets are "frozen," they shrink, then after they have been driven home they thaw and expand, filling the holes tightly and developing extra holding power. But heretofore it has been a problem to keep the rivets cold en route through the hot California air from the refrigerator to their destination. Transporting ice boxes loaded with dry ice, the tricycles do the trick beautifully.

Four of these tricycles, pedaled by four girls, carry a top load of 400 pounds of rivets each at a speed up to ten miles an hour. The rivets are bagged like peanuts in 400 sorted sizes, and every day the tricycles make 200 flying trips from main storage refrigerators to riveting stations throughout the factory. It is estimated that the tricycles save the company \$50,000 yearly by speeding up production.

Reclaiming Precision Gage Blocks

A CONTROLLABLE, chrome-plating process has been developed at General Electric's Lynn River Works for reclaiming precision gage blocks worn to below required accuracies. The method by which the old blocks are built up gives them five times the wear as when the

reclaimed blocks and
other working sets being
checked by Margaret
Lynn with the master set
of blocks.

were new.

The three-step re-claiming process is performed by women. First, the blocks are lapped .0002 inch undersize. Then an even coating of chrome plate .00015 inch .0002 inch thick is applied to each of the two working surfaces, making the blocks from .0001 to .0002 inch oversize. In the third step, the blocks are lapped to size. They are checked for size and parallelism on a Pratt & Whitney—Gen-

eral Electric electrolimit gage, and for flatness on an optical flat.

Maximum tolerance over or under the required size is 0.000005 of an inch (five millionths of an inch). The average error is no more than one thousandth the thickness of a human hair. The blocks are checked periodically with a master set to make sure they are up to standard.



Mrs. Evelyn Maher of Lynn, whose husband is "somewhere" with the U. S. Navy, is shown lapping one of the plated blocks to size. An expert at precision work of this type, she has been with G. E. fourteen years.



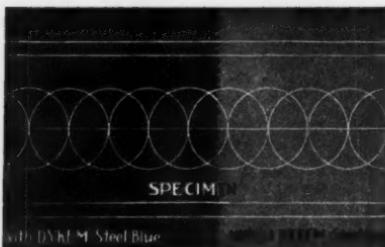
By Using a D-2 Caterpillar Tractor to Clean Out Open-Hearth Furnace Slag Pockets, Six Laborers Were Able to Do the Job in Two Days Saving 1,200 Tons of Steel Production

Timken Reduces Time Required for Cleaning of Open-Hearth Slag Pockets

THE serious labor shortage recently forced Timken to find a new solution to the problem of cleaning out open-hearth furnace slag pock-

ets. This job normally requires the services of men from 3 to 4 days and it is laborious hand and air-tool work. On a recent open-hearth furnace rebuild, laborers were able, with a D-2 Caterpillar Tractor upon which

was mounted a Traxcavator, to finish the job in 2 days. Among other things, the rapid clearing away of the broken slag by this mechanical device made it possible to break the slag loose much faster; consequently the furnace rebuild required only 2 days instead of 17 days and more than 1,200 tons of steel production were saved thereby.



DYKEM STEEL BLUE Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY
2301 F. NORTH 11th ST. ST. LOUIS, MO.
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WHEELS & POINTS

THE BAY STATE
METHOD OF FORMING
FROM UNIFORM BLANKS
IS REALLY SOMETHING!
-SEND FOR HELPFUL
CATALOG, DESCRIPTIVE
FOLDER AND STOCK
LIST.

BAY STATE

BAY STATE

ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

Lapping Dies in the Slotter

THE final finishing of a die by the lapping method is at best, a tedious operation—especially when performed by the time-honored hand method. And the accuracy of a hand-lapped job is usually nothing to boast of, either. However, a considerable amount of the labor and cost can be eliminated and an accurate job can be obtained by using a set-up simi-

lar to the one illustrated here.

The job in process is a high speed steel compression die, and the machine is a Universal Slotmaster equipped with a special lapping ar-

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New Pocket-Sized Selector Table of RECOMMENDED EMERGENCY STYLES REED STANDARD STOCK KNURLS

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Lapping a High Speed Steel Compression Die
by the Use of a Universal Slotmaster and
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Stock most Std. Sizes to 16 Dia.
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SEE PART LIST
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Dia.	Face	Price
2"	\times $2\frac{1}{2}$ "	\$1.25
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3"	\times $3\frac{1}{2}$ "	2.25
$3\frac{1}{2}$ "	\times $3\frac{1}{2}$ "	2.55

We Supply Fractional Dia. and Face Pulleys—from Large Casting Stock.

VACUUM CUP METAL PULLEY CO., Inc.
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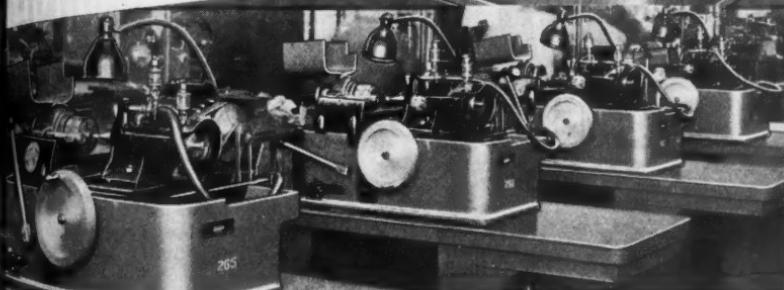
Increase
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Production

This entire
machine
and found
designed
possibly
own use
(NOTE: This
Grinding M

SIOUX VALVE FACE GRINDING MACHINE Goes Industrial!

Manufacturer converts it for use in die work

American ingenuity has found another additional use for this machine — internal grinding of tool steel dies.



This enterprising war production plant converted it (see left of machine) to take the place of expensive grinders (unobtainable) and found it to be as efficient, for exacting work, as those especially designed for this work.

Possibly you can find a way to convert our regular machine for your own use and step up production.

(NOTE: This machine is NOT furnished as shown, but only in the regular Valve Face Grinding Machine set-up, details of which will be sent upon request.)

Ask your
SIOUX
Distributor
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MUNTEON & CO., INC.



WORLD OVER

SIOUX CITY, IOWA, U. S. A.

bor. The arbor is mounted in the standard clapper box tool holder of the machine, and is gradually worked into the die opening aided by pressure from a coil spring.

The operation is started by lowering the lapping arbor to the mouth of the die opening, and then setting the down-stroke of the slotter so that it will completely compress the spring. The spring is mounted between a shoulder on the shank of the lapping arbor and the tool holder. As the lapping arbor operates under pressure of the spring it gradually works its way into the opening, during which the spring gradually relaxes.

When the spring is completely relaxed the down-stroke of the slotter is again set to completely compress the spring and the operation is repeated until the full length of the opening in the die has been lapped. Besides saving time and labor, all the

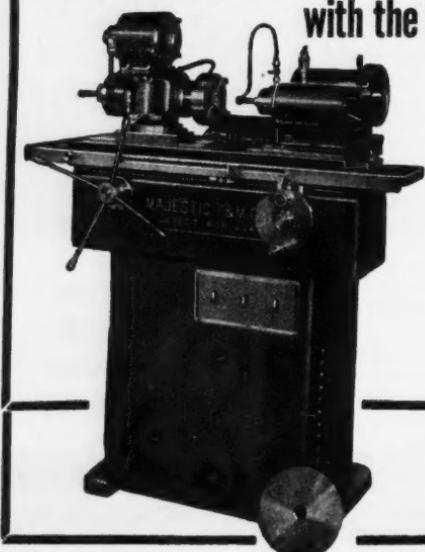
inaccuracies such as bell-mouth, etc., etc., are eliminated.

Lux Goes To War

THE ladies who "Lux" their dresses daily may not find themselves up against priority problems yet because of war industry demands, but at least in one instance their favorite soap flakes have been drafted for war production.

In broaching a hole in a pressure pump valve part in mass production difficulty was experienced in obtaining the desired smoothness of finish when the hole, $\frac{1}{2}$ inch in diameter and $2\frac{1}{4}$ inches long, was being broached. Numerous cutting fluids were tried with indifferent success until the engineer from the Colonial Broach Co. of Detroit, makers of the broach, and the valve manufac-

SIMPLIFIED INTERNAL GRINDING with the MAJESTIC INTERNAL GRINDER



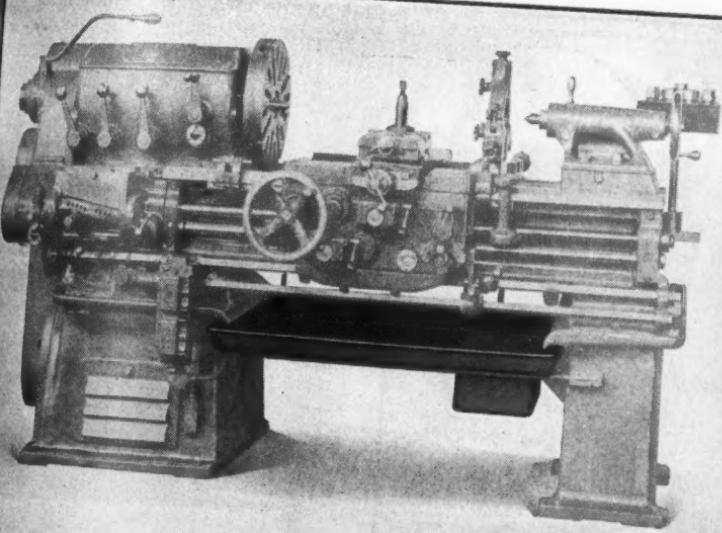
An exceptionally wide range of internal grinding jobs can be handled on the New Majestic Internal Grinder. Its simplicity of design and ease of operation are features of utmost importance in providing maximum grinding output at low cost.

SPECIFICATIONS

Length of table, 48". Swing over table, 10". Travel of cross slide, $2\frac{1}{2}$ ". Precision dial graduated to .0001". Precision bearing work head. Speeds — 100, 225, 350 r.p.m.

Write for complete details contained in New Bulletin

Majestic Tool & Mfg. Co.
2950 E. Woodbridge Detroit, Mich.



Precision LATHE PANS

Now it's possible to secure Precision Lathe Pans ready to be put into place. Littleford's 60 years experience in the fabricating of such units is your assurance of quality workmanship. Send in blueprints for prices and delivery data. Skilled workmen and modern equipment keep prices low and cut time in production. Littleford can speed up your war task, so send in blueprints today.



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REQUIRES
 ONLY FRAC-
 TION OF
 APPLIED
 PRESSURE
 AS COM-
 PARED TO
 STAMPING.

**QUICK
 SET-UPS**

**MODEL 25
 HI-DUTY
 MARKING
 MACHINE**

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.

1806 BELLE PLAINE AVE.
 CHICAGO, ILLINOIS

hit on the idea of experimenting with a solution of ordinary Lux and water. The result was completely satisfactory, the hole was broached



A Smooth Finish in This Pressure Pump Valve Part is Produced by Broaching, Using a Coolant Fluid Made of "Lux" Soap Suds

smooth as the ladies' dainties, and the Lux soap solution is now being used in regular production.

"Men, Machines and Morals." To commemorate the 50th anniversary of the Osborn Mfg. Co., Cleveland, Ohio, the company has published a 75-page book entitled "Men, Machines and Morals." Written by Julian Street and illustrated with pen and ink drawings by Wally Morgan, the book tells how the Osborn Mfg. Co. has grown from a small brush concern to one of the world's largest manufacturers of industrial brushes and foundry molding machines under the guidance and leadership of its illustrious president, Franklin C. Smith. A copy is available to any company executive who will address a request on his firm letterhead.

"Lindberg Cyclone Heat-Treating Furnaces in the Aircraft Industry" is the subject of a four-page illustrated folder prepared by the Lindberg Engineering Co., 2458 W. Hubbard St., Chicago Ill. Copy free upon request.

LUFKIN MICROMETERS

Good tool men the country over appreciate the accuracy and reliability of Lufkin Micrometer Calipers. Lufkin "mikes" are the ideal tool for accurately checking machined parts in which close tolerances are required. Because of their sturdy construction they stand up well under constant use. Because of their design they are easy to adjust and easy to read. Write for complete catalog.

12-c.

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DISTRIBUTOR



LUFKIN

SAGINAW, MICHIGAN • NEW YORK CITY
TAPES • RULES • PRECISION TOOLS



Westinghouse Electric Heating Gun for Riveting

An electric heating gun designed primarily for use in riveting hard-to-reach parts of airplanes is now being manufactured by the Electric Appliance Division of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Shaped like a sub-machine gun, the device is construct-



Westinghouse Electric Heating Gun for Riveting

ed to shoot heat into a special Du rivet containing a small explosive charge about the size of a pin point in shank end. The heat is said to set the charge within two to six seconds, force of the explosion expanding the shank to a barrel-shaped closing thus firmly fastening together the metal parts desired.

The principal parts of the gun modifications of the company's per time electric range surface heating and the thermostat which regulates temperature of electric irons. The heat is imbedded in the cast iron barrel of the gun, with the wire element set in a tube-shaped metal jacket. The thermostat is installed in the cord circuit to enable the operator of the gun to select the proper temperature needed for riveting, depending upon the size of the rivet to be exploded.

Circo Portable Gun Cleaner

The illustration shows a portable cleaning unit especially designed for gun production which has been placed on the market by Circo Products Co., 2835 Chester Avenue, Cleveland, Ohio. Available in two models, designated as the 50-MG and 20-MM, the unit includes a tank which is equipped with a strainer for filtering metal chips and other foreign solid particles. The strainer is arranged so that it can be easily removed for cleaning without emptying the tank.

The Circo Gun Cleaner may be used with any cleaning solvent or compound. The cleaning solution may be used either



Rush it by Air Mail

to Bryant

BRYANT'S specialized experience in the highly specialized field of internal grinding is unmatched by any other organization devoted solely to internal grinding problems.

Whether you're striving for increased war production today or planning new peace-time products for tomorrow, Bryant engineers are geared to help you cut costs and save time.

If you have an internal grinding problem, the solution is simple: Rush it by air mail to Bryant!



BRYANT CHUCKING GRINDER CO.

Springfield, Vermont, U. S. A.

Your tap
has
outlasted
any others
which we
have used

EXCERPT FROM CUSTOMER'S LETTER

A spinning finger of polished steel . . . cutting delicate chip curls . . . a thread is formed, accurate and true to the thousandth of an inch . . . dozens of threads, hundreds of threads, thousands of threads . . . a Threadwell Ground Thread Tap is setting new records for "holes per tap" somewhere on the production front.

In our files are dozens of recent letters of thanks that fall into two groups . . . letters from purchasing men in appreciation of the personal attention their orders for taps have received from Threadwell and its distributors, and letters from production men telling us how well our taps have performed in high speed tapping machines.

If your "bottle-neck" is threading tools, call on your Threadwell distributor.

THREADWELL TAP AND DIE COMPANY, GREENFIELD, MASS.



SALES AGENTS

Canada: Bridge Machinery Co., Montreal
England: Skylux Ltd., London

Threadwell
"TAPS OF DISTINCTION"

hot or cold but is said to work faster and better when warmed. The cleaning liquid volume can be controlled at flusher handle without stopping motor.

The Circo Portable Gun Cleaner is furnished complete with electric immersion heating unit which is thermostatically controlled to the correct operating temperature. Where heat is not required



Circo Portable Gun Cleaner

cannot be used with safety, the heating unit may be removed or left unconnected.

In using the cleaning unit, the gun part is placed on a work screen in the tank and the switch for operating the cleaning liquid pump turned on, thus providing a constant flow of cleaning liquid which flushes the work until it is clean. The tank may be quickly emptied of its contents through a drain cock or by use of the pump to direct and dispose of the clea-

**Long Distance tolls cut
the Distributor's gross
from \$6⁰⁰ to \$2⁰⁰**



. . But his customer got the Gauges in time!

Recently a Purchasing Agent handed a Distributor's salesman an order for a set of Gauges—normally a stock item with any well-equipped Jobber.

But the local factories are loaded up with precision work—first it seemed Gauges would be hard to find, finally the salesman admitted none were to be had.

"We haven't quit trying," he reminded the P.A.—from his own office he called a responsible manufacturer 600 miles away. "Yes," replied the Gauge man, "we have some of those sizes and will ship today."

This incident is typical of the unusual services that many Mill Supply Distributors are rendering their customers during the Emergency.

When the Distributor billed the job, he added \$6.00 normal gross profit. Then he paid the Telephone Company a \$4.00 toll, leaving \$2.00 for himself. Still he feels he is away ahead because one of his standard policies is to say "thanks—sure we'll take care of you on every order."

You like to do business with firms like that and so do we. Years ago we began appointing them *our* Distributors—and your close-at-hand source of supply for Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout Industrial America.

The **CLEVELAND** TWIST DRILL COMPANY
30 READE ST. NEW YORK 1242 EAST 49th STREET CLEVELAND
6515 SECOND BLVD., DETROIT 9 NORTH JEFFERSON ST. CHICAGO 650 HOWARD ST. SAN FRANCISCO
LONDON - E. P. BARRELS, LTD. - 35-36 37 UPPER THAMES ST. L.C.A.



"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU



Awarded August 8, 1942





The High Speed Air-Driven Router Tool Shown Here Ensures Standard Size Door Openings and Eliminates Much Hand Work in the Construction of the P-38

skinned edges of the P-38 nose wheel well, located in the bottom of the fuselage. Previous to the development of this tool every door was a hand-fit job. The router shown here, operating on tracks built into an insertion jig, now makes a door opening which is uniform every plane and eliminates hand fitting of the doors, thus also eliminating many man hours of work.

ing liquid wherever desired. The Circo Gun Cleaner can also be used to clean other types of parts.

Routing Nose on P-38

A NEW development at the Lockheed Aircraft Factory, designed to speed the P-38's on their way, is the special piece of equipment shown here together with its operator—mechanette Vera Lowe. The tool is a high speed air-driven router which trims off and trues up the

Dumore Portable Precision Grinder is the subject of a 36-page catalog published by The Dumore Co., 182-L, Racine, Wis. The catalog illustrates and describes more than 15 models of grinders. Principal dimensions are given with outline drawings. Grinding quills and spindles for each grinder are shown in the range of work that can be handled is specified.

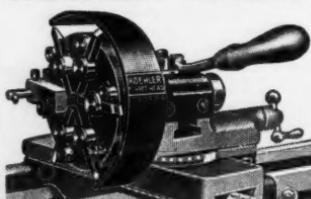
In addition, the catalog includes cross-sectional drawing showing the internal construction of the Dumore Portable Precision Grinder as well as numerous application photographs illustrating the range and scope of work that can be handled with these type of grinders. Copy of Catalog No. 42 free.

KOEHLER TURRET HEADS and CARRIAGE STOPS

MADE IN 2 SIZES

6 TOOL TURRET
and
6 POSITION STOP
for 9" - 12" Lathes

8 TOOL TURRET
and
8 POSITION STOP
for Lathes over 12"



Write for Circular

MASTER MACHINE COMPANY, 19 Grove St., Stamford, Conn.

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38

Welded STEEL Machine BASES

P-39 m
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**Base for
Multiple Spindle Drill
for Drilling
Rifle Barrels**

In order to meet
war production schedules on
machines, machine tool manufacturers
along production lines must be sure of getting the Machine
Bases and Frames they need —
as soon as they need them.

Given the fact that more and more
quills are being built by Mahon, they are buying bases built
by Mahon.

With years of specialized experience in
producing intricate designs and
sizes and shapes — plus com
munity service — has
established the Mahon organiza
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able source of supply.

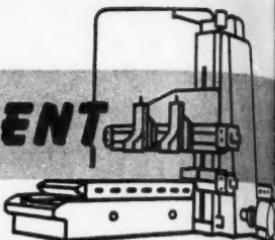
Your blueprints will receive our
immediate attention. Quotations
will be sent you without delay.

H. C. MAHON COMPANY
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Manufacturers of welded ma
chine frames and bases and
many other steel products.

MAHON

NEW SHOP EQUIPMENT



LeMaire Hollow Milling and Facing Machine

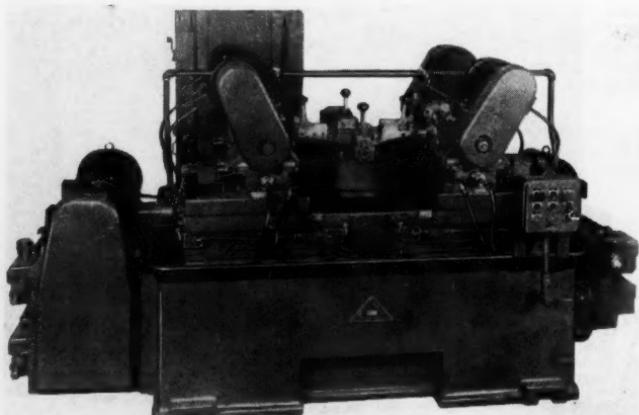
A machine especially designed to hollow mill a round trunnion on each end of a turbine blade and at the same time face the blade to length is announced by the LeMaire Tool & Mfg. Co., 2659 S. Telegraph Rd., Dearborn, Mich. An index table having four special toggle clamp fixtures is located in the center of the machine, with hollow mills on two sides operating on horizontal slides. Each slide has two auxiliary slides on which the cutter heads are mounted. Power for moving the slides is furnished by hydraulic units mounted on each end of the machine. The indexing mechanism for the table is enclosed in the base of the machine, which also provides a reservoir for coolant.

After loading a workpiece in the fixture nearest to him, the operator presses the cycle starting button, thus turning the table 90 deg. around toward the left where a roughing operation is performed on the workpiece. The station directly opposite the operator is

not required for the particular job to be done. The fourth station, or one to the right of the operator, provides a finishing operation on the piece. As the operator loads each piece, work is proceeding on the pieces already in fixtures to the right and left of him.

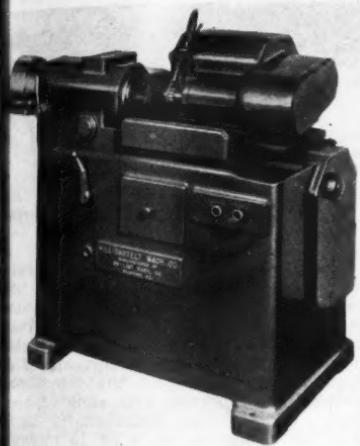
As soon as the horizontal slides are in position, the cutter heads advance rapidly toward the work and go into feed, hollow milling a trunnion on one end of the slide blade stock. At the end of the milling cycle, the cutter heads retract rapidly, after which the horizontal slides move back to the left of the machine to complete the entire working cycle. During the working cycle, the operator unloads and reloads the front fixture, starting each new cycle with a push of a button.

The auxiliary slides supporting the cutter heads are pivoted and equipped with protractor and vernier scales, permitting the heads to be fixed so that trunnions can be hollow milled at any angle. This feature is said to make the machine flexible enough to produce blades with trunnions straight with the axis on both ends, with one trunnion straight and the other at an angle, or with a trunnion element only at one end, with both trunnions at any angle with the axis. Work may be done with the means of convex-shaped cutter heads, or with concave shaped cutter heads, or with trunnions that can also be produced with extended multiple heads, which is particularly indicated for including facing, drilling, and reaming operations, or can be used with a chuck and made stationary, a



Hill-Bartelt Thread Milling Machine

The Hill-Bartelt Machine Co., 229 S. Church St., Rockford, Ill., announces a thread milling machine which is available in two models—a single-purpose unit designed for production runs on a specific job and a general-purpose machine with adjustments which permit setup to changed for handling a wide variety



Hill-Bartelt Single-Purpose Thread Milling Machine

work. Both models employ the same main features of design.

The Hill-Bartelt Thread Milling Machine is fully motorized, with all driving elements completely enclosed in a rugged structure. Electrical controls and coolant system are also fully enclosed, with suitable access doors and latches provided. The spindle is located 3 inches from the floor, and the machine requires a floor space of $42\frac{1}{4} \times 28$ inches.

The single-purpose model can be arranged for cutting either right or left-hand external or internal threads, using multiple type thread mill. Feeding is accomplished by means of a cam which is synchronized with the work spindle and governs the complete cycle, including rapid return and dwell for reading. Work up to 3 inches in diameter can be held in the air-operated collet chuck of the machine. Controls include start and stop buttons for the motors, a feed clutch release lever, and

ROGERS REAMERS

SINCE 1885



Fig. 37

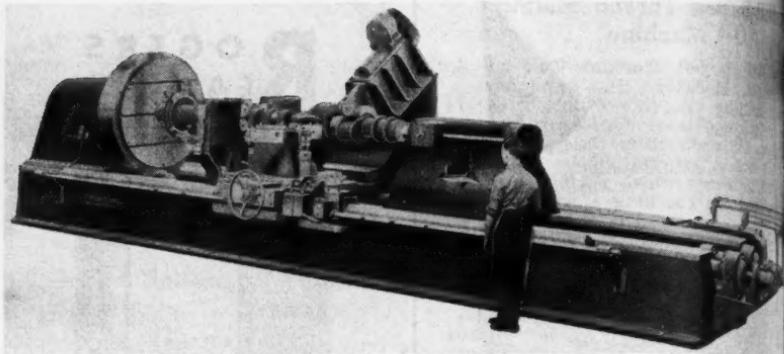


Fig. 39

Conserve High Speed Steel by using Rogers Inserted Blade adjustable-for-wear Reamers.

Align and concentric in diameter down to $\frac{1}{8}$ inch.

**JOHN M. ROGERS TOOL CORP.
GLOUCESTER CITY NEW JERSEY**



Wickes Model UH-60 Universal Crankshaft Lathe

chuck operating handle. Due to its sturdy design and simplicity of operation, this machine is said to be well suited to the threading of noses of 75 mm. shells.

The general-purpose model is equipped with a cutter head which has a tilting adjustment for aligning the cutter with the helix angle of the thread. Either single or multiple type cutters may be used. Two types of feed are available—cam or lead screw—and may be selected as desired. The machine is designed to cut threads from 5 to 32 pitch up to 9 inches in length with a single cutter and up to 2 inches in length with a multiple cutter. In addition, the machine is provided with a controllable cross feed which permits cutting of pipe threads or partially tapered threads. For added work support, the design of the machine includes a tailstock mounted on V-ways. By properly setting up, this model can be made to function as a fully automatic thread miller.

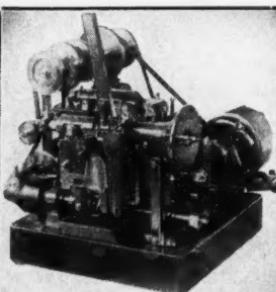
Wickes Model UH-60 Universal Crankshaft Lathe

The illustration shows an extra heavy duty universal type crankshaft lathe designated as the Model UH-60 which is now being manufactured by Wick Brothers, Saginaw, Mich. The machine is a single end drive unit and is designed for machining the intermediate main line bearings and ends of heavy duty Diesel type crankshafts having line bearings up to 8 or 10 inches in diameter.

The back roller rest shown is used for supporting the bearing being machined in order to prevent deflection of the crankshaft during the machine operation. The rest is located in a heavy back tool housing and is movable along the lathe bed to any position desired. A heavy duty four-jaw steady rest is also shown on the bed for supporting a main line bearing which has been previously machined.

A three-way turret is mounted on

WALTHAM



Pinion and Gear Cutting Machine

Will make 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to 1 $\frac{1}{4}$ inches. Revolving cutter makes successive cuts on blank held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut.

Write for Bulletin No. 112

WALTHAM MACHINE WORKS,

Also Thread Millers, Milling Cutters, Sub Presses

Waltham, Mass.

CLECO

SHEET HOLDERS

Why the ORIGINAL Sheet Holder
Offers You the FINEST Service:

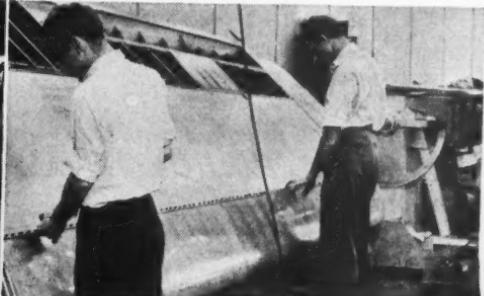
1. Saves 80% of time ordinarily required for securing sheets prior to riveting. Eliminates use of holding screws or bolts.
2. Exerts 50 lbs. of even clamping pressure—no buckling or distortion—no loosening due to vibration of riveting.
3. Different color for each size facilitates identification, speeds up insertion.
4. Access to only one side is necessary for insertion and removal.
5. Locking stem has correct diameter for rivets being used—no drilling or reaming.
6. EXCLUSIVE REPAIR AND EXCHANGE SERVICE
Damaged sheet holders can be sent to our plant or branch office repair stations for prompt repair at nominal cost. Exchange stocks also available at these repair stations.

Write for Bulletin 87. THE CLEVELAND PNEUMATIC TOOL COMPANY, 3781 East 77th St., Cleveland, Ohio.
Branch offices in all principal cities.

★ BUY U. S. WAR BONDS AND STAMPS ★



Sheet Holders on a Fuselage Assembly in Jig



"Clecoing" an Airplane Wing

cross slide and tooling provided for turning, checking, and filleting operations. The lathe is equipped with hydraulic longitudinal feed to the carriage and with hydraulic cross feed to the cross slide. The hydraulic feeds provided are from 0.005 to 0.125 inch per revolution through variable delivery hydraulic pump. The main drive motor, feeds, and rapid traverses are all controlled from electric drum switches located on the apron convenient to the operator.

The Wickes Model UH-60 Universal Crankshaft Lathe has a swing over bed of 61 inches and swing over cross slide of 36 inches. The machine shown is designed to accommodate crankshafts up to 16 feet in length, however, the unit may be made with beds of any desired lengths. The net weight of the machine with a 29-foot bed is 69,000 lbs. The main drive motor is a 30 h.p., adjustable speed, d.c. unit.

Colonial Universal Broach Sharpening Machine

A universal broach sharpening machine for sharpening either round or flat

broaches is announced by the Colonial Broach Co., Detroit, Mich. Of rugged streamline construction, the machine is designed to accommodate flat broaches up to 65 inches in length between teeth and round broaches up to 72 inches between centers and 6-inch overall diameter. Change-over from round to flat broach sharpening can be accomplished with few adjustments and without special tools.

The machine has a broad rectangular cast iron base of rigid construction to eliminate vibration, the ends being extended to provide a full-length support for the working table, which has an overall length of 99 inches and width of 11½ inches. The table travels on one flat and one V-shaped way or guide. Lubrication of the table is maintained by rollers which are submerged in oil wells and which contact the sliding surfaces.

The grinding wheel head is mounted on a vertical column attached to the bed of the machine with replaceable V-gibs. The head has a maximum travel of 12 inches. A cross slide mounted above the graduated indexing support on the top of the vertical column provides a 10-inch travel of the grinding wheel spindle transversely to the working table. The grinding wheel spindle

BLOWS CUSHIONED



Coiled Rawhide faces strike effective blows without marring or battering; speed up work; reduce spoilage. Hold true faces—strike accurately. Outlast several ordinary mallets. Reduce bounce and recoil—prevent fatigue. All sizes with light or weighted heads. Write for Catalog.

CHICAGO Rawhide MFG. CO.

1281 ELSTON AVE.



CHICAGO, ILLINOIS.

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Of rug
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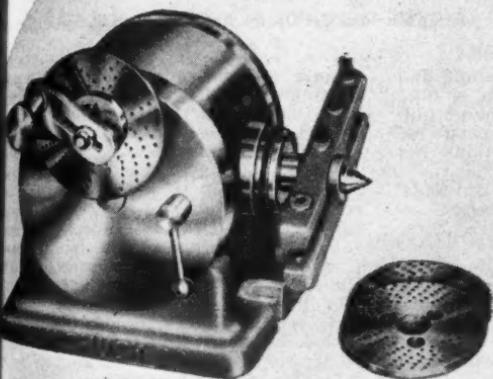
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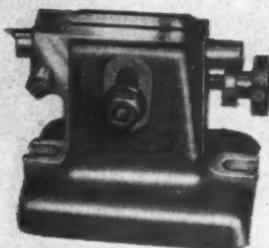
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L-W DIVIDING HEADS

Astonishingly low priced, but high in quality, these new L-W 11" Universal Dividing heads give the utmost in accuracy at a cost lower than any similar piece of equipment on the market. Ruggedly built, constructed with many new features which increase their accuracy and their use for practical, profitable shop operation.



Model BP



MODEL BP FOR PLAIN MILLING MACHINE

\$128.55

MODEL AU—FULL UNIVERSAL FOR COMPLETE INDEXING AND SPIRAL CUTTING

\$194.65

HEADSTOCK — New, ruggedly designed for maximum rigidity. Can be swiveled to an angle.

TAILSTOCK — New design, heavier and stronger.

HEADSTOCK SPINDLE — Tapered bearings, bored for No. 10 B. & S. taper. Increased diameter and length. Threaded nose $2\frac{1}{4}$ " diameter 10 thread USS.

WORM — Made from special alloy steel, accurately finished, end thrust taken by ball bearings. Means are provided to make adjustment of worm wheel easily and accurately.

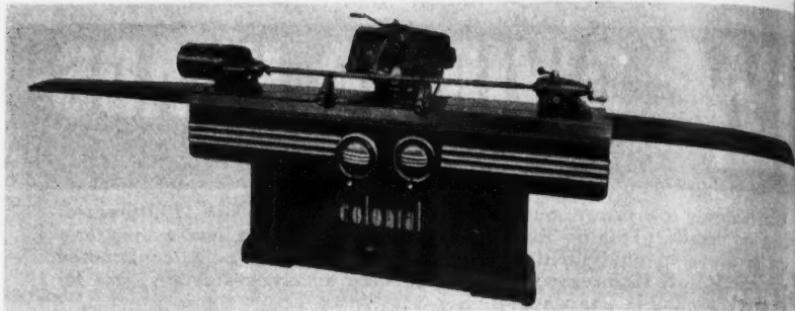
WORM WHEEL — Large diameter, 40:1 ratio, accurately generated, securely mounted on spindle.

EQUIPMENT — $\frac{5}{8}$ " table slot tongues, three index plates are furnished, dividing all numbers to 50, and even numbers to 100, with the exception of 96 T. The Index chart furnished gives all divisions obtainable to 380.

L-W CHUCK CO.

20 N. ST. CLAIR ST.

TOLEDO, OHIO



Colonial Universal Broach Sharpening Machine Set Up for Round Broach Sharpening

mounted on preloaded precision ball bearings and is belt driven by a $\frac{1}{4}$ h.p., 3,600 r.p.m. motor. Interchangeable pulleys provide various spindle speeds up to approximately 7,500 revolutions per minute.

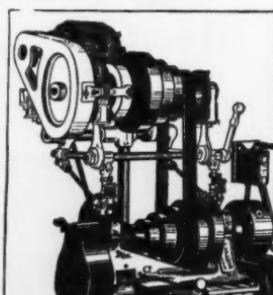
A feature of the Colonial Universal Broach Sharpening Machine is the use of two handwheels to provide three movements of the grinding wheel head and work table. Rotation of the handwheel on the right moves the table to the right and left under the grinding wheel head. The left handwheel has two positions—"in" and "out." In the "in" position, rotation of the wheel controls the horizontal feed of the slide and grinding wheel head. In the "out" position, the handwheel controls the vertical movement of the grinding wheel head. The shift from "in" to "out" position is quickly made. A quick-action lever located above and to the left of the grinding wheel head provides a rapid traverse action for the horizontal slide.

For cylindrical broach sharpening, the headstock is provided with a $\frac{1}{2}$ h.p. motor and reduction gearing to produce

spindle speeds of 200 and 400 r.p.m. Change in speed is obtained by a shift lever located in the headstock housing. The tailstock is equipped with a spring-loaded quick-release lever.

To sharpen cylindrical broaches, the left handwheel is placed in the "in" position. The barrel-type steady rests furnished with the machine are of no construction, with contact points made from round fiber to prevent injury to the broach. The table mounting for the steady rests is actuated by quick-action lock screws for rapid location and adjustment. The spindle, motor, and cross slide assembly may be rotated in a horizontal plane on the vertical column to obtain the desired grinding wheel angle.

For grinding flat or surface broaches, the cross slide handwheel on the front of the machine is placed in the "out" position. The cross slide is then moved across the faces of the broach teeth with quick-action lever. The grinding wheel spindle and motor unit is graduated to permit the wheel to be set at any angle with the faces of the broach teeth to obtain the proper cutting hook.



Noise is a business error

You get the speeds you need with a Remco, without the penalty of high price. Fast, quiet, speed changes. No ear-splitting clash of metal-on-metal. Instead the motor on a Remco takes hold gradually by slipping the belt — simple friction-clutch action. Such keen minded engineering, smarter design, makes Remco the choice of shrewd buyers everywhere. Join them! Remco Products Corp., State and Hay Sts., York, Pa.

REMCO MOTOR DRIVES
for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

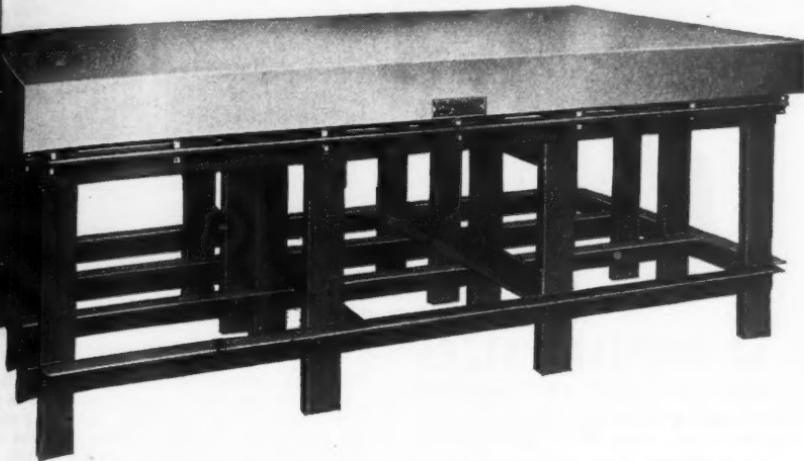
Challenge

SEMI-STEEL

LAYOUT SURFACE PLATES

(PLANER FINISH)

... Are on the job when a true, rigid surface is required for layout, inspection or assembly work, made of special analysis semi-steel, planed perfectly smooth and square, these layout surface plates are lasting, dependable and accurate.

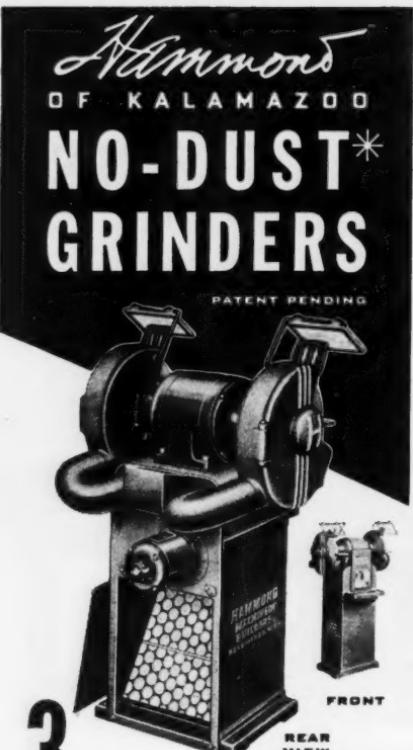


AVAILABLE IN EIGHT STANDARD SIZES

from 30x60 inches to 54x144 inches (all 6 inches thick) with or without the strongly reinforced all-steel stand, arc-welded to produce absolute rigidity. (Shown above). This stand is equipped with lock leveling screws which enable the user to level his plate quickly and lock it securely. Write today for detailed specifications. 440

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EASTERN SALES OFFICE: 50 CHURCH ST., NEW YORK



3 POPULAR SIZES FOR 10" 12" 14" WHEELS

***COMPLETELY SELF-CONTAINED
GRINDER AND DUST COLLECTOR**

SAVE SPACE—Only 6½ sq. ft. where average grinder and independent dust collector take almost 15½ sq. ft.

SAVE TIME—Set up anywhere near electrical outlet and put it to work.

SAVE "MAN-HOURS"—Protect health, keep 'em working.

Other Hammond Products: Carbide, Tool, Snagging Grinders; Abrasive Belt Surfaces; Cylindrical Finishing Machines; Polishing Lathes, Rotary Automatics

Hammond
Machinery Builders INC.

★★★ 1615 DOUGLAS AVENUE ★★★
KALAMAZOO • MICHIGAN
Eastern Branch—71 West 23rd Street, New York, N.Y.

The Colonial Universal Broach Sharpening Machine is equipped with lubricant fittings throughout to insure long life and smooth operation. Wheel head gearbox and other important parts are factory packed with lubricants to eliminate need for frequent attention.

The headstock and grinding wheel spindle motors are designed for operation on either 220 or 440 volts, with button controls with overload and



Colonial Universal Broach Sharpening Machine Arranged for Flat or Surface Broach Sharpening

voltage releases are provided. The space occupied by the machine is approximately 20 x 4 feet, including maximum table travel. Weight of the machine is approximately 6,800 pounds.

Sciaky Type PMCR.2S16 Rocker Arm Resistance Welder

Designated as the Type PMCR.2S16 rocker arm resistance welder designed for the spot welding of aluminum and its alloys is announced by Sciaky Brothers, Inc., 4915 W. 67th St., Chicago, Ill. Features of the machine include adjustable electrode tips which may be set at an angle without impairing their operation thus making possible the welding of unusual shapes and sizes of metal. Gages and dials of the unit are located on the frame where they are readily visible to the operator.

The Sciaky Type PMCR.2S16 Rocker

Snap-on "MIDGET"

**Puts Drilling SPEED and POWER
into tightest spots!**

The Snap-on "Midget" solves the problem of getting fast, capable drilling power into close corners and "tight spots" on production, assembly, and installation work. Full $\frac{1}{4}$ " capacity but weighs only $2\frac{1}{4}$ pounds — only $2\frac{1}{8}$ " wide. Fits snugly and naturally in the hand for sustained drilling comfort that permits highest output.

The "Midget" is 100% anti-friction ball and needle roller bearing construction and practically vibrationless in operation. Switch trigger is fitted with a lock pin for continuous operation.

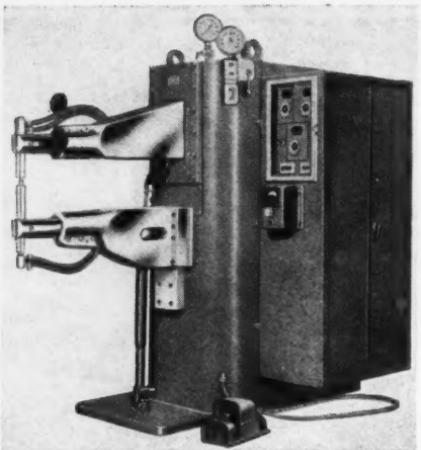
Other Snap-on drills currently available include utility and heavy duty models up to $\frac{3}{4}$ " capacity. Prompt service through 35 Snap-on factory branches located in key cities. Write for catalog of 3,000 Snap-on hand and power tools.

**SNAP-ON TOOLS
CORPORATION**

32-B 28th Avenue Kenosha, Wisconsin



Snap-on Tools
THE CHOICE OF BETTER MECHANICS



Sciaky Type PMCR.2S16 Rocker Arm
Resistance Welder

Arm Resistance Welder is arranged so as to compensate for the natural expansion which takes place when the metal is in a molten state during the welding process. The machine preheats the

metal, thus tending to overcome thermo conductivity and thereby shortening down the cooling process, and provides a "forging" pressure which is used to eliminate the possibility of shrinking the metal after the weld has been completed. Weld settings are the same as those embodied in standard type Sciaky welders.

The Sciaky Rocker Arm Welder designed to provide a total pressure of 3,000 lb. between the electrode tips from a supply line of 90 lb. using a normal throat depth of 34 inches. The unit has a welding stroke of $\frac{1}{2}$ inch, retraction stroke of $3\frac{1}{2}$ inches, and welding capacity of 0.080 inch plus 0.080 inch Alclad. For special work, a 45-deg. faceplate can be incorporated with the vertical faceplate of the machine.

Pines Automatic Centering Machine

The illustration shows a two-spindle automatic centering machine for bars up to 6 feet long which has been announced by the Pines Engineering Co., Aurora, Ill. One chuck and one lathe

AMERICAN MEASURING INSTRUMENTS CORPORATION

Announce their removal to:

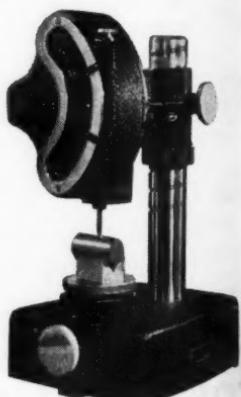
**240 West 40th Street,
New York City**

where augmented facilities, efforts and skills will be, as in the past, at the disposal of their clients.

AMERICAN MEASURING INSTRUMENTS CORPORATION

240 WEST 40TH STREET NEW YORK CITY

*Manufacturers of Indicating Gauges,
Plug Ring Snap Gauges, Jigs, Fixtures,
and Instruments.*



**AMIC PRECISION
INDICATING GAUGE**

LET'S "TALK SHOP"

So often "talking shop" is a pleasant pastime—and nothing more. But it can be profitable, if you "talk shop" with the right people.

The MID-WEST ABRASIVE COMPANY, 1960 E. Milwaukee Avenue, Chicago, Illinois, for instance, maintains a highly competent staff of engineers who are paid

"talk shop" with you. If you have a grinding, honing or superfinishing problem in your plant it will pay you to "talk shop" with them. They can help you because they have helped so many other production men solve problems similar to yours—whatever those problems may be.

One of our field engineers, for example, was consulted by a gun manufacturer who was having trouble honing three inch and one inch gun barrels. Recommendations from the MID-WEST engineer reduced the

gun maker's honing time by 83 per cent. Another MID-WEST engineer virtually doubled a manufacturer's shock strut production by producing a stone which served efficiently as both rougher and finisher. In still another case, MID-WEST MICRO BOND stones were credited with practically eliminating rejects, which had presented a serious problem for a large gun manufacturer.

Those are but a few of numerous instances in which MID-WEST products—honing and superfinishing stones, grinding wheels, sandpapers—have aided in the war effort by helping to increase production, save time, money and man-hours, and relieve "production line headaches" suffered by harassed production men. That's why we say:

It Will Pay You to "Talk Shop" with Us!

MID-WEST ABRASIVE COMPANY

Manufacturers of *DEPENDABLE Abrasives*

1960 E. MILWAUKEE AVENUE

DETROIT, MICHIGAN

- ★ Honing Stones
- ★ Superfinishing Stones
- ★ Grinding Wheels
- ★ Emery Cloth
- ★ Sandpaper

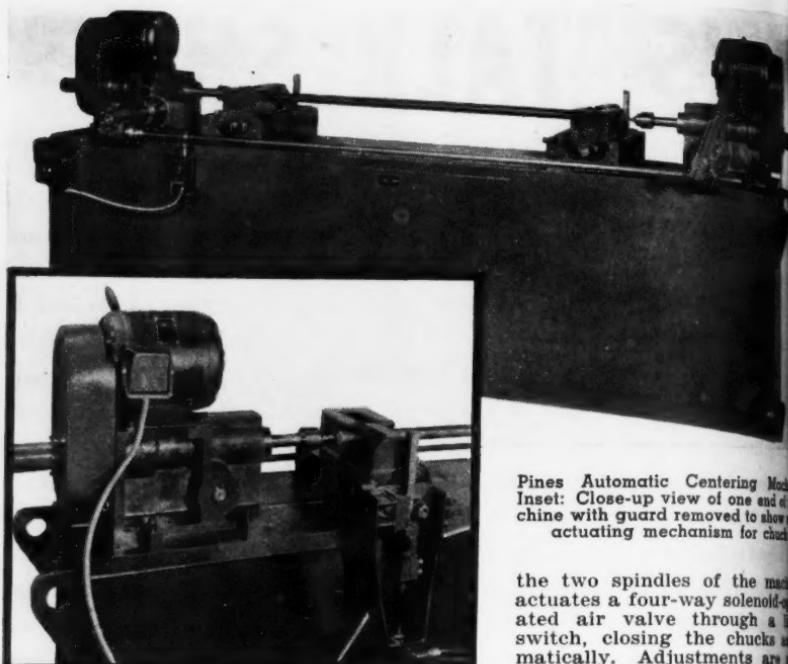
Mid-West Abrasive Company,
1960 E. Milwaukee Avenue,
Detroit, Michigan

Gentlemen: Please send me additional information on Mid-West Micro Bond honing and superfinishing stones.

Name _____

Company _____

Address _____



Pines Automatic Centering Machine
Inset: Close-up view of one end of the machine with guard removed to show actuating mechanism for chuck.

of the machine are stationary while the other chuck and head are movable for adjustment to accommodate different lengths of bars. For centering pieces from 18 down to 6 inches long, one chuck is removed from the machine.

The chucks have a maximum capacity for 5-inch diameter bars and are both actuated by air cylinders directly connected through racks and pinions on the screws for opening and closing the jaws. A cam on the lay shaft for advancing

the two spindles of the machine actuates a four-way solenoid-activated air valve through a switch, closing the chucks automatically. Adjustments are provided for aligning the chuck with the spindles to compensate for wear.

Lima Electric Pedestal Grinder

An electric pedestal grinder especially designed for toolroom use has been placed on the market by The Lima Electric Motor Co., Lima, Ohio. Features include totally-enclosed motor, push-button motor control, and

"OUTWEARS

the best

Bronze Metal

ARGUTO OILLESS BEARING CO.

20 years ARGUTO without a drink

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.

WAR-TIME SHOP RECIPES

for thread production



RECIPES — 140 pages of them — to help you get more accurate threads in production — with better taps, thread gages, thread milling cutters.

If your shop is producing threaded parts, you too should have one of these Shop Recipe books: the new "DETROIT" loose-leaf Catalog No. 22.

Write on your company letterhead.

DETROIT TAP & TOOL CO.
8432 BUTLER STREET, DETROIT, MICHIGAN, U. S. A.

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February,

January, 1943

ARBORS FOR SHELL REAMERS

TAPER
SHANK

STRAIGHT
SHANK

CARBON STEEL

STRAIGHT SHANK

No.	Price Each	Fitting Size Reamer	Length Overall Inches
RA6S	\$3.00	1-1/16—1-9/32	10
RA7S	3.30	1-5/16—1-21/32	11
RA8S	3.60	1-11/16—2	12
RA9S	4.00	2-1/16—2-1/2	13

TAPER SHANK

No.	Price Each	Fitting Size Reamer	Length Overall Inches	Morse Taper Shank
RA6	\$3.30T	1-1/16—1-9/32	10	3
RA7	3.75T	1-5/16—1-21/32	11	3
RA8	4.15T	1-11/16—2	12	4
RA9	4.65T	2-1/16—2-1/2	13	4

Write
for further details.

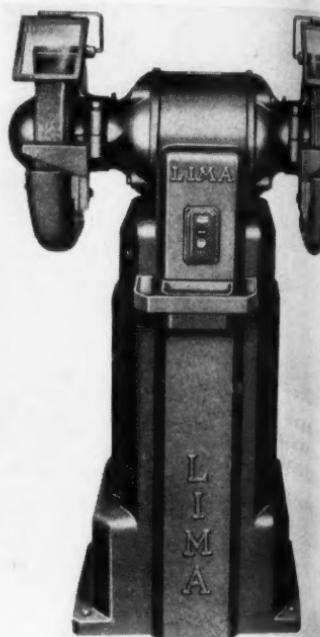
SCHULTZ & ANDERSON CO.

MACHINE TOOLS

109 EDISON PLACE NEWARK, N. J.

overload protection, dust-tight ball bearings, improved wheel guards with exhaust vents, combination lift-out water pot and tray.

Of rigid construction, the Lima Electric Pedestal Grinder is designed for operation on 220, 440, or 550 volt, 3 phase alternating current. It is available in two types designated the 24S and 25S, which have a capacity of 2 and 3 h.p. respectively. Both



Lima Electric Pedestal Grinder

are designed for use with 12 x 1½ grinding wheels and have a speed of 1,800 r.p.m. when operated on 60 current.

The wheel arbor of each unit is 1 inches in diameter and is located 1 inches from the floor. Grinding wheels on the Type 24S are situated 20½ inches apart and on the Type 25S, 24 inches apart. Both type grinders are 1 inches high overall, however, the Type 24S is 29½ inches wide overall while the Type 25S is 35½ inches. The base of each unit is 19 x 13 inches in size. Weight of Type 24S, 450 lbs.; Type 25S, 480 pounds.

FORM RELIEVED CUTTERS

are economical when you have to mill intricate shapes and outlines



WHEN CONSIDERING FORM CUTTERS, NOTE THE FOLLOWING:

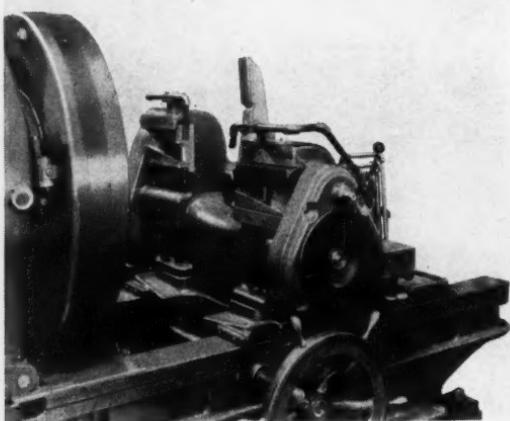
There are an infinite number of shapes, both symmetrical and irregular in outline, which can be milled efficiently and economically with Midwest Form Relieved Cutters. These cutters, provided with eccentric relief behind the cutting edges, always maintain the original outline of form when they are sharpened by grinding the faces of the teeth. However, conditions are so varied in the application of form cutters, no definite rules can be offered for making a proper selection as to type and form. When considering form cutters, send a blueprint of part to be milled; outline the cutter on the surface to be milled; furnish all dimensions of the form shown, with tolerances; specify arbor diameter, keyway size, and rotation. On unsymmetrical forms, designate below the outline, rotation, as "bottom going" or "bottom coming." Whenever possible, form cutters should have undercut teeth, the degree depending upon operating conditions. When sharpening a form cutter, the amount of undercut which is marked on the cutter should be preserved, since the form was corrected for this exact amount of rake . . . Other examples of Midwest Form Relieved Cutters may be found in Midwest's catalog 17 of Precision Metal Cutting Tools.

*Your Security and Freedom depend on your Country Winning the War.
There is no alternative. Your Country needs your Fighting Dollars
for Victory. Invest them Now in United States Bonds and Stamps.*

END MILLS • SLEEVES • COUNTERBORES • SPECIAL TOOLS • DRILLS
REAMERS • FORM TOOLS • CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS

MIDWEST *Precision*
METAL CUTTING TOOLS
MIDWEST TOOL & MFG. CO. • 2362 W. JEFFERSON AVE. • DETROIT, MICHIGAN

Landis Hydraulically Controlled
Cutting-Off Unit

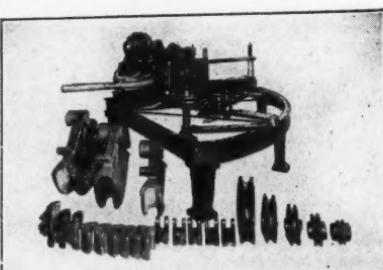


Landis Hydraulically Controlled
Cutting-Off Unit

The Landis Machine Co., Waynesboro, Pa., has developed a hydraulically controlled cutting-off unit which is designed to replace the standard carriage,

crossrail, and die head of the Landis Mill Type Pipe Threading Machine where this machine is to be used strictly for performing cutting-off operations. The unit comprises two high speed steel cutting-off tools mounted in massive slides for maximum rigidity. These slides operate through a hydraulic cycle which provides rapid traverse of the tools to the work and rapid retraction of the tools after the cutting-off operation is completed. A single lever is used to control both the forward and return movements of the tool slides.

Complete operator control of the hydraulic cycle provides for varying the rate of feed of the cutting-off tools and for adjusting the length of travel of the tools for different thicknesses of tubing. The adjustment for rate of feed is made through a single control valve so that the rate of feed for both front and rear cutting-off tools will



THE AMERICAN COLD PIPE, CONDUIT
AND TUBE BENDING MACHINES

QUICK DELIVERIES . . .

HAND OPERATED TYPES in capacities of 1 in., 2 in., 3 in., 4 in., 6 in.

MOTOR OPERATED in three capacities, $\frac{1}{2}$ in. to 4 in., $\frac{1}{2}$ in. to 6 in., and $\frac{1}{2}$ in. to 8 in.

Early shipments on hand operated machines; on motor powered from four to six weeks.

Wire or air mail letter for printed matter and prices.

Three New Machines: No. 1—For bending extra heavy pipe up to 3 in. No. 2—For bending all kinds of thin gauge tubing without use of mandrel. No. 3—For bending IPS conduit.

AMERICAN PIPE BENDING MACHINE CO., INC.

BOSTON, MASS., U.S.A.

25 PEARL ST.



FOR NATIONAL
DEFENSE
We Are Ready
To Serve You

Spec

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• Buck finished bearing solid, r tenance and "S" IDs, O blueprints dimensi

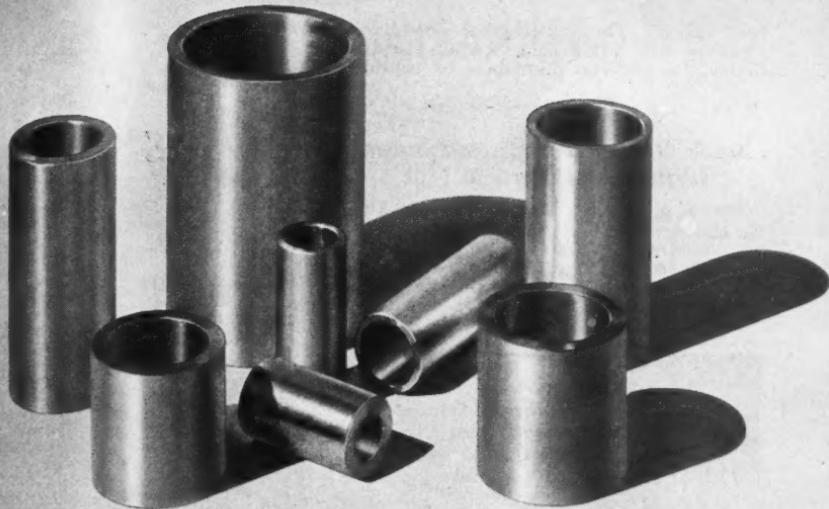
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BRONZ



Specifying OD, ID and Length is not enough ...you need proven serviceability too

* Buckeye's 1088 stock sizes of fully finished ready-to-use phospher bronze bearings—560 sizes of cored and solid, rough and finished 13" maintenance bars—Graphited bearings—and "Specials" in a wide variety of IDs, ODs and lengths to customers' blueprint, do more than meet mere dimensional requirements.

Buckeye are quality bearings—at standard prices—capable of giving a maximum of long, efficient, trouble-free service.

The outstanding performance of these bearings results from Buckeye's

skilful, experienced and painstaking manufacture. Through the use of virgin metals only, impurities in Buckeye bearings are held to negligible limits—and the complete laboratory and metallurgical control maintained over charging ratios, melting and pouring temperatures, and all other manufacturing processes assures the production of an exceedingly high quality of product—free from porosity—each piece of which month after month measures up fully to Buckeye's exacting specifications. No order is too big or too small for Buckeye.

Buckeye
BRASS AND MANUFACTURING COMPANY

BRONZESMITHS

SINCE 1900

5412 HAWTHORNE AVE.



CLEVELAND, OHIO

BRONZE SLEEVE BEARINGS • STANDARD SIZES OR TO CUSTOMERS' BLUEPRINT
IN ANY RECOGNIZED BEARING METAL ANALYSIS

the same. The cutting-off toolslides likewise are adjustable, within certain limits, for various diameters of tubing.

Blank & Buxton Improved Index High Speed Vertical Mill

Blank & Buxton Machinery Co., 3102 E. Michigan Ave., Jackson, Mich., announces that the Index High Speed Vertical Turret Milling Machine described on Page 234 of the July, 1942, issue of MODERN MACHINE SHOP has been

**CARROLL
AND
JAMIESON
LATHES
15" AND 16"**

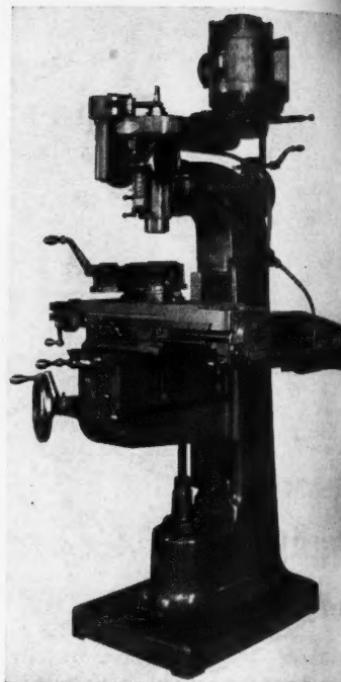


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for
Bulletin.

**THE CARROLL & JAMIESON
MACHINE TOOL CO.**
BATAVIA OHIO U.S.A.

12 Speed Geared Head Motor Drive Timken Mounted Spindle.

Modern Design— Liberal Dimensions



Blank & Buxton Improved Index High Speed Vertical Mill

further improved in that the column, knee, saddle, and table are now more heavily constructed. The improved machine is said to be sensitive enough for operation and sturdy enough in construction to permit the cutting of steel with end mills from approximately $\frac{1}{8}$ to $\frac{1}{4}$ inch in diameter. Other operating and design features of the machine

**MARKING IS POSSIBLE WITH THE
FAST, ACCURATE, PERMANENT
ACROMARKER**

ACROMARK



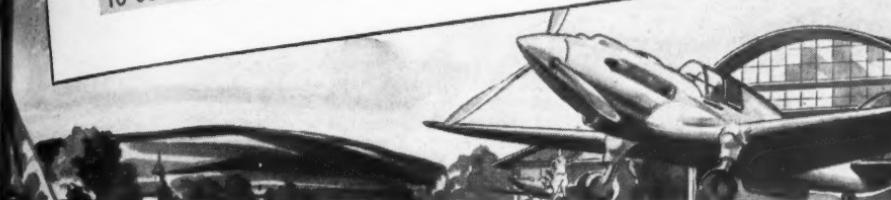
★ This ACROMARK product is used for marking numbers and letters into nameplates, tags, parts, dials and discs of steel, alloy, plastics, fibre, etc. It is only one of the wide range of machines and accessories available for marking and stamping every type of application.

Inquiries invited; write for illustrated literature; no obligation.

THE ACROMARK COMPANY
9 MORRELL STREET, ELIZABETH, NEW JERSEY

A MESSAGE TO CALIFORNIA

WE ARE PLEASED TO ANNOUNCE THE APPOINTMENT OF
SANDVIK STEEL INCORPORATED, 4415 SOUTH MAIN ST., LOS
ANGELES, AS OUR REPRESENTATIVES IN SOUTHERN CALIFORNIA.
... THIS NEW CONNECTION WILL BE OF PARTICULAR BENEFIT
TO OUR MANY FRIENDS AND CUSTOMERS IN THIS TERRITORY.



Webber Serves the Airplane Industry

In spite of the cold back here we are working 24 hours a day to maintain the accuracy required of tools for speeding the production of airplanes.

Webber Gage Blocks provide a constant unit of precision essential to achieving the uniform accuracy of parts demanded in the "line production" of airplanes.

We are proud of the experience, skill and craftsmanship that goes into Webber Gage Blocks—that makes them dependable units of measure for the great airplane industry.

If you are working with tolerances of .001" or less you should be using Webber Gage Blocks constantly—through every step of your operation.

WRITE FOR LITERATURE

Webber
GAGE COMPANY
12899 TRISKETT RD., CLEVELAND, OHIO



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BLOCKS only.

Prompt delivery to firms
furnishing necessary
priorities. Prices for Set
No. 81A—\$350.00. Set
No. 40A—\$185.00

are said to be the same as those incorporated in the previously announced model.

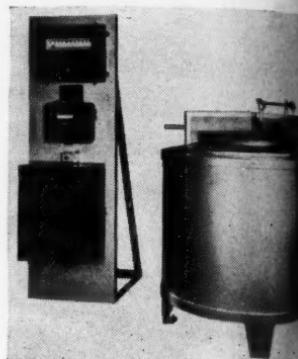
Falcon High Temperature Salt Bath Furnace

An electric pot-type high temperature salt bath furnace for the cyanide hardening of tool steel products has been added to the line of Falcon furnaces produced by H. O. Swoboda, Inc., 148 13th St., New Brighton, Pa. Designed for both production and general shop heat treating, the furnace is not only said to be suitable for cyanide hardening but for regular thermal hardening as well.

The unit has a capacity of 30 k.w. and is designed for operation on 220 volts, single phase current. It can also be arranged for use on three phase current. Maximum operating temperature of the furnace is 1,650 deg. F. A high precision control enables the unit to be operated at low temperatures for tempering workpieces.

The Falcon High Temperature Salt Bath Furnace is provided with throt-

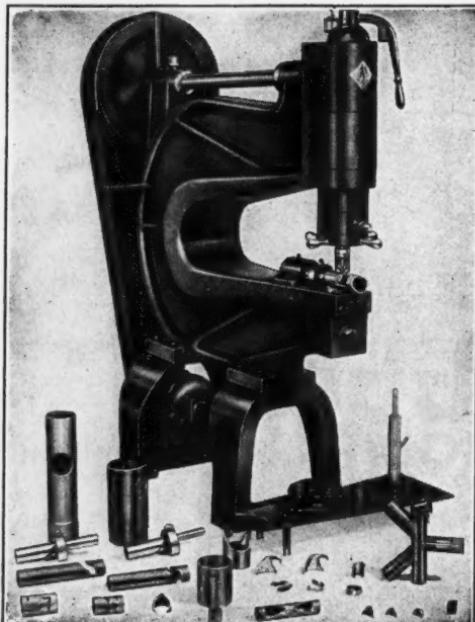
tling-type automatic controls, including a potentiometer-type control panel with an input regulator. A contact



Falcon High Temperature Salt Bath Furnace

also provided for carrying the furnace load.

The construction of the furnace includes a steel casing, brick and metal type heat insulation throughout, insu-



For **FAST** and **SAFE** cutting of sheet metal, duplicating parts, and to relieve other machine tools, investigate the

SAVAGE NIBBLING MACHINE

TUBE SLOTTING AND TUBE SHAPING

For cutting flat sheets by template or to a scribed line.

Cutting Capacities

Flat Sheets Mild Steel $\frac{1}{4}$ "

Tough Alloys $\frac{3}{8}$ "

Tubing

Wall thickness to $\frac{1}{8}$ "

1" I.D. to 36" O.D.

The Fastest Method of Tube Slotting and Shaping by Guide Template

Ask for BULLETIN "H"

Manufactured by

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Since 1885

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Pioneer Manufacturers of Nibbling Machines



FULL RANGE DRILLING FOR HIGHEST PRODUCTION

- The choice of fine machine tools now will help you meet those new production schedules needed to win the war.

Footburt sensitives are built with the wide range of speeds and with the power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period.

Write, wire or phone for prices and delivery information.

THE FOOTE-BURT COMPANY
CLEVELAND, OHIO

Detroit Office: General Motors Building



NO. 2 MACHINE WITH BACK GEAR

8" or 12" Overhang •
5/8" Drilling Capacity in
Steel • Optional Speed
Ranges • 185 to 2300
R.P.M. • 280 to 3450
R.P.M. • Vertical Motor
Drive with Standard
Single Speed Motor •
Power Feed Assembly
• Tapping Attach-
ment • Coolant Outfit.

FOOTBURT

Sensitive
DRILLING MACHINES

swinging-type cover, and alloy pot which is suspended from the casing into the furnace chamber by means of a heavy cast intermediate ring. The pot has an inside diameter of 16 inches and depth of 18 inches. Heating elements are supported in open-face grooves in high grade refractory heater plates. Terminals of the furnace extend through the casing into an enclosed box located on the back of the housing, thus eliminating exposed electrical connections at any point on the furnace.

Brady-Penrod Model SP-400 Coolant Pump

Designated as the Model SP-400, a foot-mounted centrifugal coolant which can be quickly installed on present machines or easily adapted to new machines is announced by Brady-Penrod, Inc., Muncie, Ind. The pump, which is said to be instantly self-priming, is sturdily built to withstand 24-hour service and is designed to handle abrasives and steel chips.

The flow of coolant is controlled by means of a valve at the discharge line. According to the manufacturer, this

valve can be used to control the coolant from a few drops to full

MODEL SP 400



Brady-Penrod Model SP-400 Coolant Pump

ity of the pump without overdriven motor. All parts are of first-class materials, precision-machined.

Diamond Model 20 Milling Machine

A small milling machine designed as the Model 20 has been added

SPEEDS PRODUCTION! CUTS TIME AND COSTS!



\$24

HAND FREE OPERATION!

- Foot operation leaves BOTH hands free for fast insertion and removal of work. Vise stays open or closed with out constant foot pressure.

FAST! POWERFUL!
FOOT CONTROLLED!

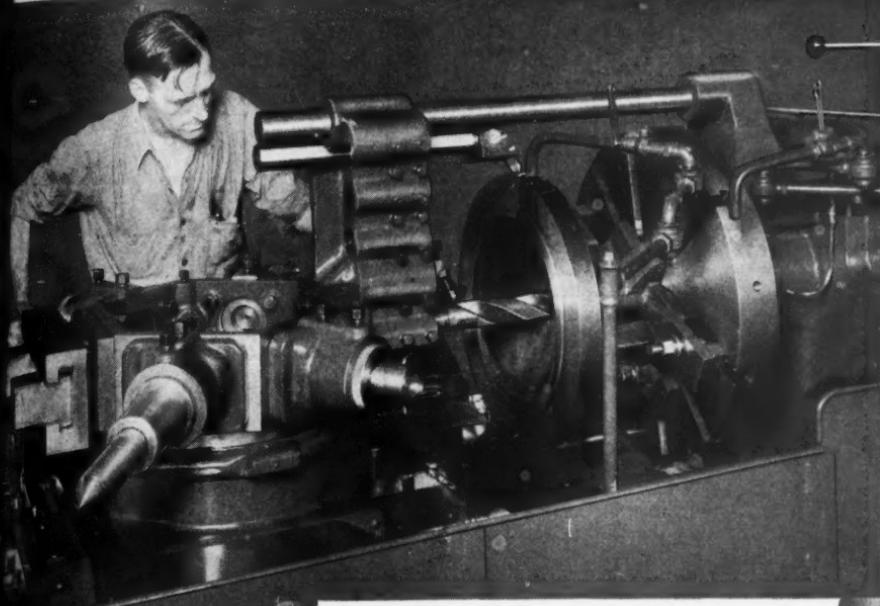
PROMPT DELIVERY

- At last! A powerful pneumatic, a remarkably low priced Expertly engineered, SPEEDY AIR VISE is fast, strong, hard gripping, husky, easy to operate . . . just the vise you need to speed up your production. Operate from a central line or individual compressor, giving a grip of 15 times air pressure. Jaws up to 3 inches, easily fitted to lathes, parts, jigs, etc. Because of low cost, can be economically used on drill press, miller, filer and similar equipment.

Write at Once For Circular

W. R. BROWN CORP., 5720 ARMITAGE AVE., CHICAGO, ILLINOIS

MODERN EQUIPMENT Cuts MANUFACTURING COSTS



Finishing a cast alloy high pressure steel valve bonnet, 19½" largest O. D., with 11½" distance from face of work to face of holding fixture.

A 1-S, 25" CINCINNATI ACME Universal Turret Lathe handled these large diameter valve parts and cut costs 35% for a leading valve manufacturer.

Available with "Fixed Center" or "Cross-Sliding" Turret. Swings: 27" over bed; 25" over carriage wings; 19" over cross slide.

Shipyards, Navy yards and other plants have effected similar savings.
A machine that is going all out for Victory.

**THE ACME MACHINE
TOOL COMPANY**
CINCINNATI **OHIO**

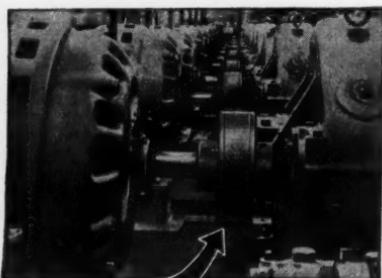
**USE
KANTI-LEVER COUPLINGS**

THEY HELP YOU Maintain Peak Production

With your machines now forced to the limit to gain peak output, the necessity of stopping for repairs becomes much greater. You can prevent many of these costly interruptions of production by using KANTI-LEVER Couplings, for they have a scientifically designed Cushion Torque that absorbs sudden load shock and torsional vibration—the two main causes of wear, fatigue and failure of machinery. The KANTI-LEVER is different from any other type and gives your machinery a protection that is vitally needed under present abnormal conditions. See cut showing 70 KANTI-LEVERS that have proved invaluable to their user by protecting the driven machines and enabling steady production for over 18 years.

Send for Bulletin No. 28-M Describing

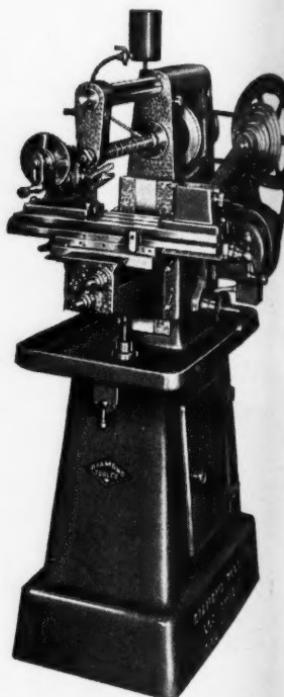
Kanti-lever Couplings



**BROWN
ENGINEERING CO., LTD.
101 NORTH THIRD ST.
READING, PA.**

line of milling machines produced by the Diamond Tool Co., Dept. MMA, E. Olympic Blvd., Los Angeles. Available in both toolroom and production models, the machine is ruggedly constructed for performing precision operations and is said to have an unusually large capacity for a unit of its size.

Outstanding design features of the machine include a precision high-speed needle overarm arbor-support bearing.



Diamond Model 20 Milling Machine

vertical collapsible pulley arrangement with safety device and motor lockout; speed changes; maximum anti-friction bearings with a minimum number of manual lubrication fittings; and a shot spider-web lubricating arrangement for the table, saddle, and knee. The production model is equipped with a larger pinion to speed up output. Accessories for the Model 20 are interchangeable with those of the Model 24 Diamond Miller previously announced by this company.

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and pr
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precision
have an
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Woody Spencer
says...

"KEEP YOUR TOOLS IN CONDITION"

Good tools can stand lots of hard use . . . keep them in condition, and they'll stand much more . . . turn out first rate work, and more of it. PICK OUT THE RIGHT TOOL—KEEP IT IN CONDITION—USE IT CAREFULLY AND INTELLIGENTLY. Let these simple rules guide you, and they'll guide us all to Victory.

Let us help you select the right tap for your job.

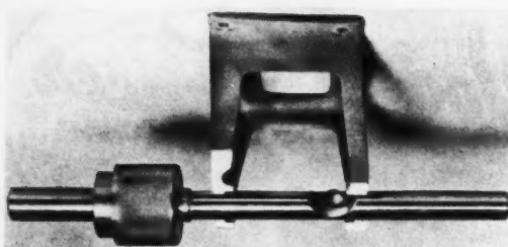
FROM CUSTOMERS' BLUEPRINTS WE QUITE FREQUENTLY MAKE RECOMMENDATIONS FOR "THE RIGHT TAP AT THE RIGHT TIME."



THE RIGHT TAP AT THE RIGHT TIME"

The Wood & Spencer Company
Cleveland, Ohio

Nobur Burr-Removing Tool



Nobur Burr-Removing Tool

A tool designed for use in quickly removing burrs or sharp projections from the edges of drilled, reamed, or bored holes is now being offered by the Nobur Mfg. Co., 910 N. Orange Drive, Los Angeles, Cal. The illustration shows the tool being used to remove burrs and sharp edges from an aileron pulley bracket which has been cutaway to show more clearly how the job is done. The tool is provided with a blade which is ground to a two-step diameter, thus enabling it to deburr the outer face and inner shoulder of the ball bearing seat simultaneously.

The Nobur Burr-Removing Tool is

available in $\frac{1}{8}$ -inch progressive sizes from $\frac{1}{8}$ to 1 inch. Special sizes and special blades for unusual burring problems can be furnished on order. According to the manufacturer, the Nobur Burr-Removing Tool can be operated by any workman in complete safety.

Automatic Indexing Turret Oster No. 601 "Rapiduction" Turret Lathe

The Oster Mfg. Co., 2061 E. 6th Street, Cleveland, Ohio, announces that the Oster No. 601 Turret Lathe described on Page 214 of the December, 1941, issue of MODERN MACHINE SHOP is now equipped with an automatic indexing six-station turret instead of the manually-controlled type turret.

The machine, which has capacity for 1 $\frac{1}{2}$ -inch round stock for cutting-off, threading, facing, drilling, and precision

LOOK AT THESE FIVE FEATURES!

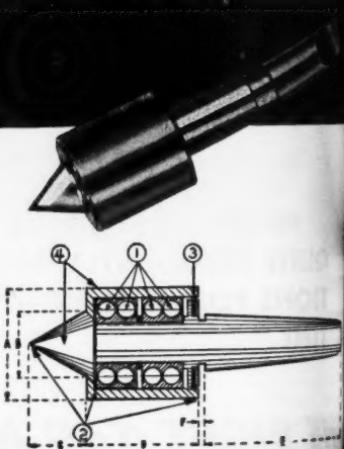
of QUADRO Precision LIVE CENTERS

FEATURES . . .

1. FOUR ROWS of precision BEC-4 specification bearings.
2. SHORT OVERHANG assures rigidity and accuracy—eliminates "chatter".
3. Positive FELT-SEAL excludes dirt and retains lubrication.
4. HARDENED AND GROUND CONE. Point accurate to within .0002".
5. HEAVY DUTY. Note combined radial thrust load at 100 r.p.m.

DIMENSIONS

Model Type No.	A	B	C	D	E	Combined Radial-Thrust Load At 100 R.P.M.	Net Price
2	1 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{16}$	2 $\frac{1}{8}$	1600	\$23.00
3	1 $\frac{1}{8}$	3 $\frac{1}{8}$	3 $\frac{1}{8}$	1 $\frac{1}{16}$	3 $\frac{1}{16}$	3300	\$25.00
4	2 $\frac{1}{16}$	3 $\frac{1}{16}$	3 $\frac{1}{16}$	1 $\frac{1}{16}$	4 $\frac{1}{16}$	7500	\$35.00
5	2 $\frac{1}{16}$	1 $\frac{1}{16}$	1	2 $\frac{1}{16}$	5 $\frac{1}{16}$	12000	\$47.00



All orders must be accompanied
by extendable priorities.
WRITE TODAY!

FISHER TOOL CO.

226 LAFAYETTE ST. NEW YORK, N.Y.

Gets into tight spots !



BOOK at that O.D., and you'll know why Apex stud setters get into hard-to-reach places with such ease and precision—even in the hands of un-skilled workers. These simple, clean-cut stud setters have small diameters for their capacities. They are extremely easy to adjust for tight of thread on stud and maintain proper adjustment in service. Simple

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Distributors of friction tapping chucks, quick change and positive drive drill chucks, vertical float tapping chucks, parallel floating tool holders, power bits for Phillips, slotted head and Clutch Head screws, hand tools for Phillips and Clutch Head screws, aircraft universal joints, plain and universal joint socket wrenches.



Oster "Rapiduction" Turret Lathe Equipped for Automatic Turret Indexing

ing, tapping, reaming, facing, threading, and for many other operations, has been redesigned and simplified in design and construction to meet requirements for low cost and easy operation.

Upton Triangular-Shaped Electric Salt Bath Furnace

A unique type of electric salt bath furnace which is said to assure efficient heat-treating operations under power supply conditions that are ordinarily considered unsuitable for externally heated salt bath furnaces has been brought out by Upton Electric Furnace Div., 7450 Melville Ave., Detroit, Mich. The furnace is also said to be designed to provide long pot life and to eliminate possibility of shorting and burning work even though operated by inexperienced workmen.

Of triangular shape with an electrode in each of the three corners, the furnace is bricked in such a manner that each electrode is placed in a deep recess in the brickling, thereby eliminating possibility of contact with the work. The brickling is also said to extend sufficiently high above the surface of the salt to cut radiation and to serve as a shield for the operator as well. The steel pots included in the design of the

In War, as in Peace...

CERRO ALLOYS

SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, for engraving machine models, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-test cavities such as molds, gun chambers, forging dies, etc. and for many similar applications.

Representatives and Distributors

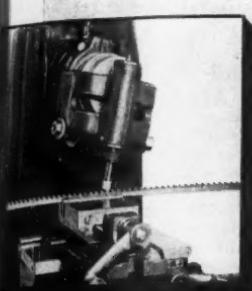
Brooklyn, N. Y., Belmet Smelting and Refining Works; Ansonia, Conn., Jackson Associates; Boston, Mass., Jackson Associates; Castoly Metal Sales Co.; Cleveland, Ohio, Die Supply Co.; Detroit, Mich., Castoly Metal Sales Co.; Chicago, Ill., Sterling Products Co., Inc.; Moline, Ill., Sterling Products Co., Inc.; Minneapolis, Minn., Northern Machinery & Supply Co.; Milwaukee, Wis., Hart C. Kettleson, Inc.; St. Louis, Mo., Metal Goods Corp.; Kansas City, Mo., Metals Goods Corp.; New Orleans, La., Metal Goods Corp.; Dallas, Tex., Metal Goods Corp.; Houston, Tex., Metal Goods Corp.; Los Angeles, Calif., Castaly Metal Sales Co.; Montreal, Can., Dominion Merchants, Ltd.; London, Eng., Mining & Chemical Products, Ltd.

Cerro De Pasco Copper Corporation

40 WALL STREET

NEW YORK CITY

LIBERTY High Speed Grinding Attachments

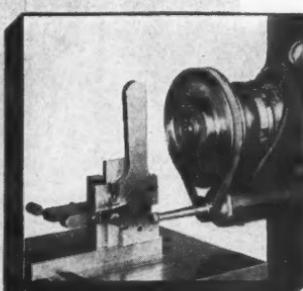


Grinding clearance of broach teeth.

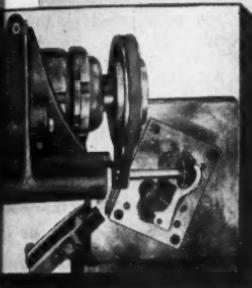
Both horizontal and vertical types are easily attached to most surface grinders for grinding angles, slots, recesses and surfaces which are impossible to reach with large grinding wheels.

For extremely accurate grinding on gages, tools, dies, etc. Assembled complete with any size bores, pulleys, belts and grinding wheels at no extra cost.

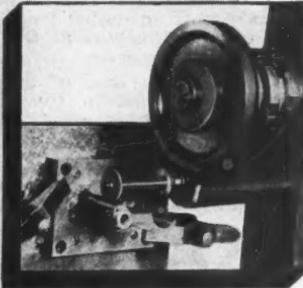
Write for details — specifying diameter of spindle head, type and make of grinder.



Grinding gage in perfect alignment with other points.



Grinding punch form.



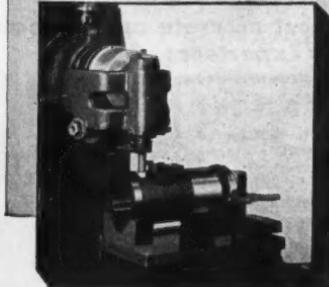
Grinding shoulder on punch.

LIBERTY TOOL & GAGE WORKS

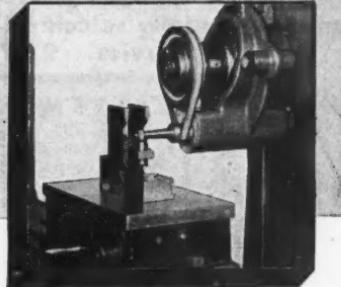
235 Georgia Ave.

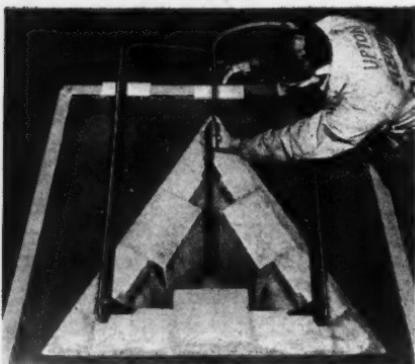
Providence, R. I.

Grinding rectangular opening in trigger casing.



Grinding gaging seat on special gage.





Upton Triangular-Shaped Electric Salt Bath Furnace

furnace are located one inside the other and are both insulated from each other and from the outside of the furnace to reduce heat losses.

The electrodes are of ordinary steel and are fastened to the water-cooled bus bars of the furnace by a single bolt connection, thus permitting rapid replacement of electrodes. Water cooling

the bus bars is said to increase efficiency of the electrical circuit and also to permit the handling of bars with bare hands even while the furnace is in operation.

Trindl Model 125 Super Industrial Arc Welder

Trindl Products Ltd., 2227 BW Belmont Ave., Chicago, Ill., is now marketing an improved heavy duty portable super industrial arc welder designed as the Model 125. This machine is especially recommended for those production and maintenance jobs which cannot be economically handled with larger type welders.

The Model 125 welder is said to be simple to operate and is of comparatively lightweight design, thus enabling it to be easily moved directly to where it can be connected to any convenient electrical circuit. For production welding, several machines of this type can be set up on benches with easy reach of the operator, thereby permitting rapid, accurate adjustments to be made for each welding operation.

The Trindl Model 125 Super Industrial

KARELSENS DIAMONDS SET IN SPECIAL ALLOY FOR ECONOMICAL WHEEL TRUEING



We Make Special Tools for
Shaping Thread Grinding Wheels.

PHONOPOLY — SHAPED TOOLS — GRINDING WHEEL DRESSERS

DIAMOND POWDER IN ELEVEN SIZES

Diamonds carefully selected for most accurate and economical service. 91 Years Experience.

SALES MEN WANTED

Big demand for our products. State qualifications fully. All information in confidence. Write — Some territories still available.

E. KARELSEN, INC.

ESTABLISHED 1852

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No red leather—no chrome trim—they're built for business—these landing barges of our armed forces.

But the lounge of a luxury liner has never supplied purer air than that breathed by our boys crowded around the fuming diesel engines of these small craft.

Ventilation must be sure. Not for comfort, but for life itself. When it was decided that no ordinary motor could be depended upon to power the vital exhaust fans necessary, WELCO was called on to build the special water-proof, drip-proof motors that would not fail.

In war or peace, when a special motor is needed, look to WELCO.

THE B. A. WESCHE ELECTRIC CO.
1626 VINE STREET **CINCINNATI, OHIO**



★ **W E L C O** ★



Tolerance .0002" @ hundreds per hr.

HAVE AN ACE UP YOUR SLEEVE

Thousands of these airplane studs (cold forged) roll into our plant every day. We Centerless Grind the center section to ".0002" at hundreds of pieces per hour. They can then be threaded and headed without being centered or rough-turned, an enormous saving to war production. Have you a clog-point or problem-part?

RELY ON ACE FOR PRECISION GRINDING Centerless, Internal Cylindrical, External Cylindrical, Blanchard Surface, Plain Surface, and Thread Grinding.

PRODUCTION MACHINING Turning, milling, drilling, cutting, tapping, and threading of small machine parts that require precision grinding —on a mass-production basis.

METAL STAMPING Blanking, forming, and extruding of small metal parts on presses up to 75-ton capacity. Spot welding, sub-assemblies and assembly of intricate radio and machine parts.

HEAT TREATING Electric and gas furnaces, individually pyrometer controlled, for high-heat, quenching, and carburizing of parts up to 24" x 28".

TOOL AND DIE WORK All operations for the production of Punches and Dies for small stampings, for Jigs, Fixtures, Gages, Moulds, Form Blocks, Tool Bits and Circular Form Cutters.

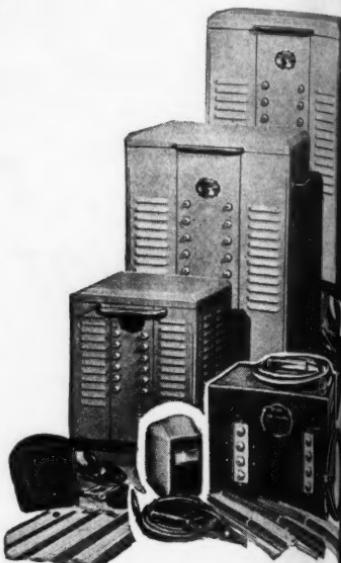
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**ACE
MANUFACTURING
CORPORATION**
for Precision Parts

1237 E. ERIE AVENUE, PHILADELPHIA

Arc Welder is furnished with a vertical type control panel and has 16 welding heat stages ranging from 10 to 125 amperes. The machine is available for operation on 110 or 220 volts and is supplied complete with headshield, etc.



Trindl Model 125 Super Industrial Arc Welder

trode holder, welding and ground cable, C-clamp, welding rods, and detailed welding and operating instructions.

DoAll Master Gage Blocks

Savage Tool Co., Dept. MM, Savage, Minn., is now marketing a line of DoAll Master Gage Blocks for use in checking and setting precision tools, instruments, gages, and so on. The accompanying illustration shows a standard set (No. 400) of these gage blocks being used to check a 4-inch micrometer.

DoAll Master Gage Blocks are supplied packed in a sturdy mahogany case containing 81 blocks ranging in length from 0.050 to 4 inches, and are produced in an "AA" grade (accuracy 0.0001").

Mechanical Load Brake Renewals are infrequent but easy

The Northern Mechanical Load Brake is rugged, long-lasting. But all brakes have bearing surfaces which must be renewed at intervals. You can do it easily on the Northern Hi-Lift Hoist—loosen a few bolts, and the brake mechanism is removed without disturbing gear case.



Write for
New Catalog of
Hi-Lift Hoists

Northern Hi-Lift Hoists
are built in 1000 lb.

to 15-ton capacity—in single motor and
two-motor types. We are in good position
to make excellent deliveries.

NORTHERN ENGINEERING WORKS

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1679 University Ave., ST. PAUL

**DoAll Master Gage
Blocks**



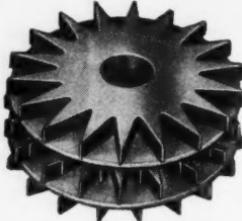
to be used in various nations for obtaining practically any dimension, in steps of 0.0001 inch, from 0.1000 to 12 inches.

**Duro 6-Inch
Rotary Table**

A 6-inch rotary table especially designed for use in hard-to-reach locations is now being produced by the Duro Mfg. Co., 800 E. 61st St., Los Angeles, Cal. The table is equipped with a worm and gear rotating mechanism having a ratio of 60 to 1. Thus, for each complete turn of the crank operating the mechanism, the table is rotated 6 degrees. Backlash is eliminated by means of eccentric adjustment between the worm

inch), "A" grade (accuracy 0.000004 inch), and "B" grade (accuracy 0.000008 inch). The blocks in addition to being extremely accurate in length have their measuring surfaces lapped to a flatness of less than a quarter wave length of light and are provided with mirror finishes, thus enabling them

DESMOND
GRINDING WHEEL
DRESSERS and CUTTERS



We can supply you with the proper Dresser and Cutter for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

THE DESMOND-STEPHAN MFG. CO.

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SIMPLEX
Steel Slide
VISES



A full line of Machinists', Filers, Welders, Production and Drill Press and Milling Machine Vises.
Let us send you our vise catalog and name of your nearest dealer.

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February, 1943



OUR JOB to design and manufacture high production tools for boring, recessing, facing, reaming, undercutting, chamfering and milling, so that you may do

YOUR JOB producing the machines of war in record time with the speed and exactness to supply the United Nations' soldier the weapons to do

HIS JOB covering the battle fronts of the world in the shortest possible time with the best we have to speed the day of ---- VICTORY.

SCULLY-JONES AND CO.

1901 SO. ROCKWELL ST.
CHICAGO, ILLINOIS U.S.A.



Duro 6-Inch Rotary Table

and the gear.

The Duro 6-Inch Rotary Table is provided with two T-slots which cross at 90 deg., thus dividing the surface of the table into quadrants. A $\frac{5}{8}$ -inch diameter hole is drilled at the center of the table. The design of the unit also includes a T-lock screw for maintaining the position of the table. Additional features comprise a beveled dial which is

accurately cut and graduated to $\frac{1}{2}$ of a degree for easy reading.

The Duro Rotary Table is ruggedly constructed of seasoned semi-steel and has an attractive finish. The unit is $\frac{1}{2}$ inches high and weighs $14\frac{1}{2}$ pounds.

Castolin Eutectic Alloy No. 24B

A special alloy having a high fluidity for use in the a.c. and d.c. welding cast iron, to be known as Castolin Eutectic Alloy No. 24B, is now being marketed by Eutectic Welding Alloys Co., 40 Worth St., New York, N. Y. This alloy is a completely ferrous alloy and is said to have exactly the same characteristics as cast iron and the same chemical and physical properties. The tensile strength of the alloy varies between 29,000 and 38,500 lb. per square inch and the Brinell hardness, between 200 and 265.

Welds produced with Castolin Eutectic Alloy No. 24B are said to be corrosion and heat resistant and, it is claimed, can be easily machined, galvanized and enameled. Uses of No. 24B include filling and filling blowholes and cracks, building up metal. The alloy is said to be adaptable for use on heavy and intricate as well as very light casting.

SHEAR-CUT HIGH SPEED END MILLS



Here's a complete line of
Single and Double End Mills.

They save time and money.
SPECIFY PROGRESSIVE SHEAR-CUT END MILLS.

Write for catalog and prices.

PROGRESSIVE TOOL & CUTTER CO.

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OUR CREED ... YOUR GUIDE TO SATISFACTION!

We'd rather make a few products WELL than a score of products of indifferent quality. That is why we have specialized for 20 years in making circular metal cutting saws, drills, combination center drills, and reamers.

By thus concentrating our efforts we can streamline our production and maintain exceptionally high standards of quality without correspondingly increasing prices.

The steadily growing demand for Circle "R" Products is convincing evidence that our creed is your guide to satisfaction. Even our enlarged plant, containing 20,000 square feet of floor space, is taxed to the limit to meet delivery requirements.

CIRCULAR TOOL CO., INC., Providence, R. I.

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CIRCLE "R" TOOLS
Made by Perfectionists

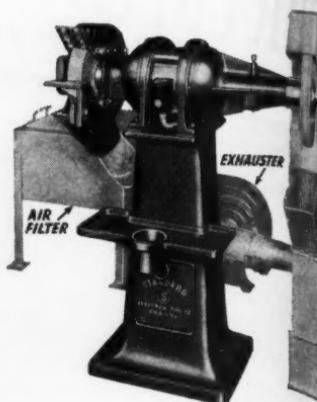


Standard Combination Grinding and Buffing Machine

The illustration shows a combination grinding and buffing machine which has been brought out by the Standard Electrical Tool Co., Dept. J, 2488 River Rd., Cincinnati, Ohio. This unit is of 2 h.p. size; however, other sizes of 1, 3, and 5 h.p. are also available. The machine is shown arranged with exhaust equipment for removing and collecting grinding and buffing particles.

The left or wheel end of the machine is provided with a safety hinge door

emery wheel guard which is adjustable to compensate for wheel wear and fitted with adjustable spark breaker and work rest. The spindle of the unit



Standard Combination Grinding and Buffing Machine



PADDOCK Ball Bearing BANDSAW GUIDES

- Reduce Blade Breakage
- Increase Production

Easily adjusted to all sizes of blades to 1½" wide.

Recommended for new and old machines running at any speed cutting all materials.

Shipped on 10 day approval

PADDOCK TOOL CO.
1418 WALNUT ST. KANSAS CITY, MO.

mounted in three heavy duty ball bearings. A tool tray together with removable water pot is fastened to the front of the pedestal.

The dust arrester assembly includes a material handling fan, blower, air filtering stand, and adjustable exhaust hood for buffing wheel. The main motor and fan motor are arranged to operate simultaneously through pressure on the start button of the machine. The dust collecting system is available separately for application to any type of grinding, buffing, and finishing equipment and is made in three sizes.

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Flexoid TOOL HOLDER Universal Head

"ONE TOOL DOES IT ALL"



Entire assembly includ...
ing bit is rigidly lock...
by a single screw.

Does away with right, straight or left hand tool holders. No change in centers necessary when resetting—5 sizes.

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THE SMITH POWER TRANSMISSION CO. CST



MOTO...

WAGNER MOTORS

can help you in your "All-Out" War Effort!

Because Wagner motors have proved their reliability and efficiency in pre-war days on all kinds of motor driven equipment, thousands of them have already gone into war service. Today you will find Wagner motors driving all types of machine tools and other motor driven equipment in war industries, army cantonments, navy yards, air fields, and on ships—delivering the same dependable service that has established Wagner's outstanding reputation for high-quality motors.

Wagner's plant is working day and night, turning out more motors now than ever before, and is supplying these dependable motors wherever they are needed to help in the "all-out" war effort.

No matter what your motor requirements are...regardless of the torque, speed, or current requirements, you can choose a motor from the Wagner line that is correctly engineered for the job. The three motors illustrated represent just a few of the various types of Wagner motors. Each motor has special electrical and mechanical characteristics that make it the ideal motor for certain applications.

FIELD ENGINEERING SERVICE!

Wagner's 25 branch offices are manned by trained field engineers, competent to solve your motor application problems. They will gladly consult with you and do everything possible to assure you the quickest delivery on the motors you need to keep your war production schedule on time in this "all-out" war effort.

Send for THESE VALUABLE BULLETINS!

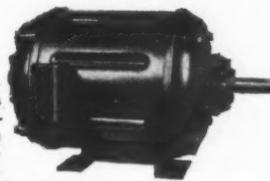
Bulletins MU-176, MU-182, MU-183 illustrate and describe the complete line of Wagner motors—a motor for every purpose. Copies of these bulletins will be sent you on request.



Type RP Squirrel-Cage motors are used on machine tools and other electrically driven equipment that operate in clean, dry locations. 1/6 to 400-hp, 25 to 60 cycles, 2- or 3-phase.



Type HP motors are ideal for machines located where inflammable materials and substances are handled or manufactured. 3/4 to 125-hp, 2- or 3-phase, 25 to 60 cycles.



Type RA Repulsion-Start-Induction motors are single-phase brush-lifting motors having high starting-torque and low starting-current. They are ideal for heavy-duty applications. Obtainable in various speeds, frequencies, and voltages; rigid or resilient mounted; 1/8 to 15-hp, 25 to 60 cycles.



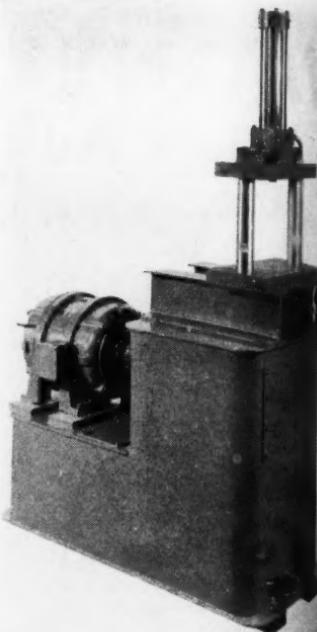
Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, Mo., U.S.A.

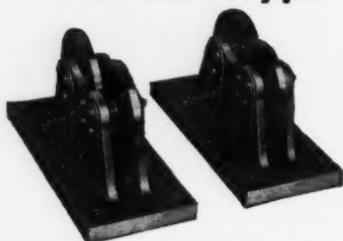
MOTORS • TRANSFORMERS • FANS • BRAKES

Hydraulic Machinery 6-Ton Hydraulic Arbor Press

The illustration shows a 6-ton hydraulic arbor press for inserting bushings, and so on, which has been introduced by Hydraulic Machinery, Inc., 10421 Grand River, Detroit, Mich. The press has a maximum stroke of 8 inches and is provided with a daylight opening of 20 inches and opening from left to right of 20 inches. The power unit and press are integral, the former being reinforced on the top by two I-beams which serve as a base for the assembly.



ANDERSON BALANCING WAYS *Pillow Block Type*



A sub base can be made of proper height to give necessary clearance for large diameter work.
Supersensitive ball bearings and hardened and ground spindles assure accuracy.

Write for details.

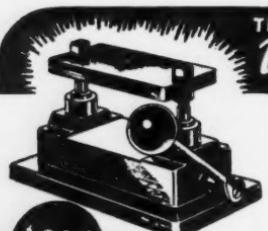
ANDERSON BROS. MFG. CO.
1926 KISHWAUKEE ST. ROCKFORD, ILL.

Hydraulic Machinery 6-Ton Hydraulic Arbor Press

A lever-operated four-way valve used to control the operation of a ram, which is provided with a chain speed of 3.4 inches per minute. The valve is self-centering and is equipped with a gage designed to register from 0 to 2,000 lb. pressure.

The complete unit measures 34 inches from the floor to the platen, 75 inches high overall, and occupies a floor space of 27 x 42 inches. The motor, which

Standard
Bars save



\$29.75

THE NEW
Universal
Vise

CUTS TOOLING TIME
SPEEDS PRODUCTION

A ready-designed drill jig body that shortens tooling time and helps you get into production faster. No complicated adjustments—the positive, quick-action lever locks work instantly, holds securely. Only an inexpensive bushing plate and adaptor needed for each job. Only \$29.75 f.o.b. Chicago.

Order Today including priority certification.

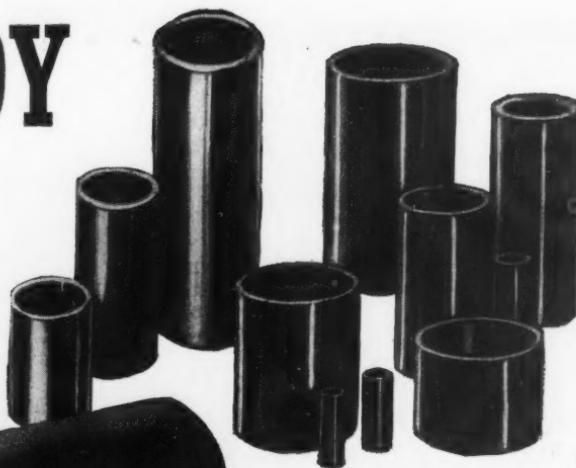
MOHR LINO-SAW CO.

* 126 N. Union Street *

Chicago



READY
TO
USE



• Bunting Standardized Bronze Bearings fit practically all applications in machine tools, electric motors and industrial machinery of all kinds.



• Bunting Ready-for-Assembly Standardized Bronze Bearings and Factory-Finished Bearing Bronze Bars save hours of valuable time and costly labor. Available in many different sizes from local wholesalers. Write for catalog . . . The Bunting Brass & Bronze Company, Toledo, Ohio. Warehouses in All Principal Cities.



Bunting

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Johnson

FURNACES

2 WEEKS
DELIVERY

No. 575

Pot-Hardening
and Melting
Furnace

\$315 F.O.B.
Factory
(Blower
Extra)



Burners are located near top of combustion chamber, to insure longer pot life. Vent damper regulates flow of exhaust gases. Semi-concealed piping. Large blower assures maximum performance.

Write for FREE Catalog

Johnson Gas Appliance Co.
585 E Ave. N.W., Cedar Rapids, Iowa

- Lid-lifting mechanism easily raises cover. Locks in UP position.
- Heavily insulated — 4½" firebrick, backed up with 3½" insulating block.
- Equipped with electric ignition for easy lighting of burners.

directly connected to the power and has a rating of 5 h.p. on 3 phase cycle a.c. and operates at a speed of 1,200 r.p.m. A Vickers pump is included as standard equipment of the machine.

Studebaker Speedpress

Designated as the Studebaker Speedpress, a hydraulic arbor press designed for use in broaching, assembling, planing, oil grooving, riveting, sizing, flanging, staking, forcing, and so on, has been announced by the Studebaker Machine Co., 9 S. Clinton St., Chicago, Ill. Especially constructed for easy and efficient operation by women as well as men workers, the press is equipped with a hydraulic foot control, thus allowing operator free use of both hands for handling work. The foot control is connected to the press by means of a flexible steel tube, thereby permitting the control to be placed in any convenient position desired.

Pressure on the middle or applicator pedal of the foot control moves the ram of the machine downward to contact the work. By depressing the right or booster pedal, a holding pressure of up to 20,000 lb. is said to be exerted on work. Pressure on the left or release pedal breaks the grip on the work, ram automatically returning to its permanent position.

Designed to handle work up to 12 inches in diameter, the Studebaker Speedpress is provided with a round ram having a stroke of 7 inches. Additional specifications of the machine are as follows: distance from top of table platen to ram in highest position, 11½ inches; size of platen, 7½ x 8½ inches; weight, 1,200 lbs.

Studebaker
Speedpress

there *IS* a difference
in taps

consider
FLUTING
for example:



The flutes are important in determining how long a tap will last. Flutes on Sossner taps are cut to the precise depth and width for maximum strength and best cutting angle—then mirror polished to keep friction at a minimum! That is just one of the reasons why Sossner taps last longer!

TAPS AND GAGES OF AMERICAN NATIONAL AND BRITISH
THREAD FORMS IN SPECIAL AND STANDARD SIZES

TAPS
GAGES

SOSSNER

STEEL STAMPS
CUTTING TOOLS

"32 year reputation for reliability and precision workmanship."

Write to SOSSNER, 161 Grand St., N. Y. C. or 27 Broadway, Lynbrook, N. Y.

inches; weight of platen, approximately 31 lb.; size of opening in base for arbor work, 6 inches; dimensions of base, 12 x 18 inches; height of machine overall not including fittings, 34 inches; weight, 208 lb.; shipping weight including platen and foot control, 303 pounds.

Lyon Hydraulic Elevating Welding Positioner

Marketed by the Lyon - Raymond Corp., 198 Madison St., Greene, N. Y., the Lyon Hydraulic Elevating Welding

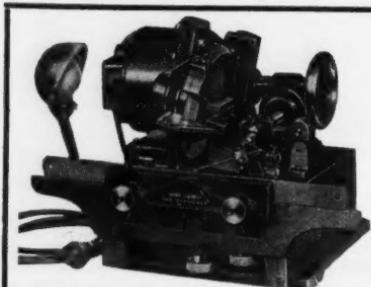
Why Use BIG MILLS on BENCH MILL Jobs?

The Lewis Bench Mill has the capacity and the operating features needed for performing high class work on small parts. No need to tie up big, expensive machines required for more difficult operations.

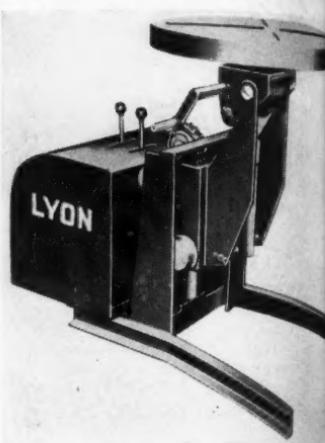
Supplied as rough or semi-finished castings, complete with detailed blueprints and all necessary parts. Can be finished and assembled in far less than new-machine delivery time—and at a fraction the cost!

Specifications, prices and descriptions of Lewis Bench Mill and over 20 other Lewis Tools for metal and wood working are contained in big new catalog sent free on request. Quotations gladly furnished.

LEWIS MACHINE TOOL COMPANY
P. O. Box 116, Station A
Dept. T-13
LOS ANGELES, CALIFORNIA



Positioner shown in the accompanying illustration is designed to position work so as to enable it to be properly welded with utmost speed and ease. The



Lyon Hydraulic Elevating Welding Positioner

is equipped with a 30-inch diameter table which can be quickly tilted and elevated through levers controlling hydraulic pump. The pump is driven by means of a $\frac{1}{2}$ h.p. motor designed for operation on 110 volts, 60 cycle single phase alternating current.

The table can be rotated 360 degrees in any position by means of a hand crank operating a worm and gear mechanism which is arranged so as to make the table self-locking at any point within rotation. If desired, the table, which is provided with T-slots for $\frac{1}{2}$ -inch bolts, may be quickly and easily removed from the top plate of the unit and the welding fixture attached.

HIGHER PRODUCTION from SHARP TOOLS

The Howe Lindsey Automatic Sharpener will keep your hack, band or slitting saws sharp at a minimum expense.

Can also be used as a cutting-off machine on wire, etc.

HOWE & SON, INC. • Hinsdale, N. H.

CORRECT TOOL HANDLING

Increases Production

ROUGH GRINDING
KENNAMETAL TOOLS



Rough Top GRINDING



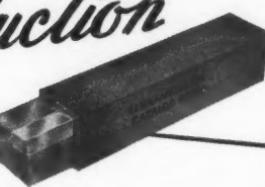
Rough End GRINDING



Rough Side GRINDING

RULE 2

USE CARE IN ROUGH GRINDING
KENNAMETAL*
TOOLS



ROUGH GRINDING

Rapid grinding is possible on large green or grey grit special loose bond silicon carbide wheels, using a water coolant with enough sal soda to make an alkaline solution and prevent rusting of the machine. A 60-grit soft bond wheel of as large a diameter as possible should be used. A 20-inch diameter wheel is preferred for the usual run of large tools such as are used in machining shells and other armament.

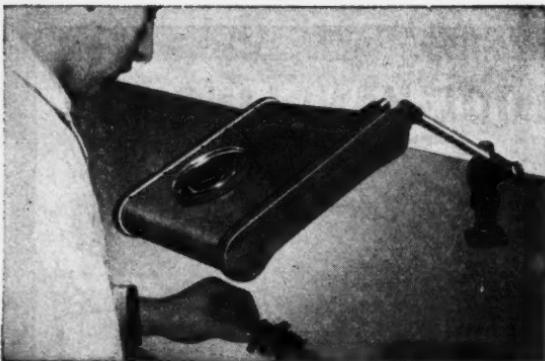
The coolant should cover the entire working face of the wheel and make contact with the wheel just above the tool. A spur wheel dresser should be used frequently to keep the new silicon carbide crystals exposed. An experienced operator can keep the wheel dressed, with the tool being ground, by maintaining a constant movement of the tool back and forth across the wheel as well as rocking the tool in both directions. A fairly heavy pressure should be used in order to break the silicon carbide crystals and thus maintain a free cutting wheel.

Light pressure merely dulls the wheel and causes a sudden local generation of heat in the tip or steel shank. The flow of water, hardness of the wheel bond, and other grinding conditions should be such that the tool, pulled rapidly away from the wheel while grinding, should not feel warm when touched with the finger.

To permit rocking the tool in all directions during the roughing operation, a narrow tool rest (approximately $1\frac{1}{2}$ inches) should be used. This rest may be set at an angle about 2° to 3° more than the clearance angle required, thus permitting a final pass over the wheel with the tool held on the rest, to true up the angles for finished grinding.

*INVENTED AND MANUFACTURED IN U. S. A.





"Inspecto-Scope" Inspection Device

When lowered and in a horizontal position, the top of the table is located 28 inches from the floor and when elevated the maximum distance in this position is 40 inches from the floor. In a vertical position, the table can be elevated so that the center is 22 to 34 inches from the floor.

The unit shown in the illustration has a capacity of 2,000 lb., however, weld-

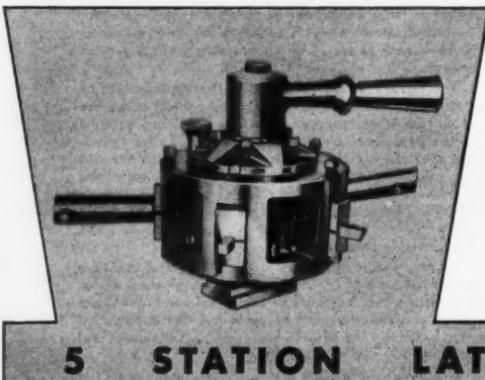
ing positioners for heavier loads are also available.

"Inspecto-Scope" Inspection Device

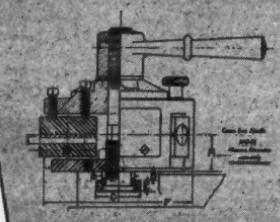
An inspection device designed for use in inspecting tools, parts, or hard-to-objects, to be known as "Inspecto-Scope," has been placed on the market by Lowe & Sons Co., 30 Ford St., Fairfield, Conn. The accompanying illustration shows the device attached to a bench for

in the continuous inspection of quantities of parts. The device may also be used over conveyor belts mounted on lathes, gear cutters, or precision grinding or machining equipment for inspecting work while being processed.

The Inspecto-Scope is equipped with an adjustable arm which enables it to be easily turned, raised, or lowered at any angle or position desired.



5 STATION LATHE TURRETS



INCREASE PRODUCTION AND SAVE TOOL TIME

Index plate has 10 stops for different tool settings. Bottom half of the Vari-Speed block oscillates in turret body and allows for minute adjustment of tool blocks. Two set screws rigidly hold bar or tool bit. Tool blocks are interchangeable in 5 positions.

Write for folder — today.



AUTOMATIC MACHINE & TOOL CO.

132 CHARLES ST.

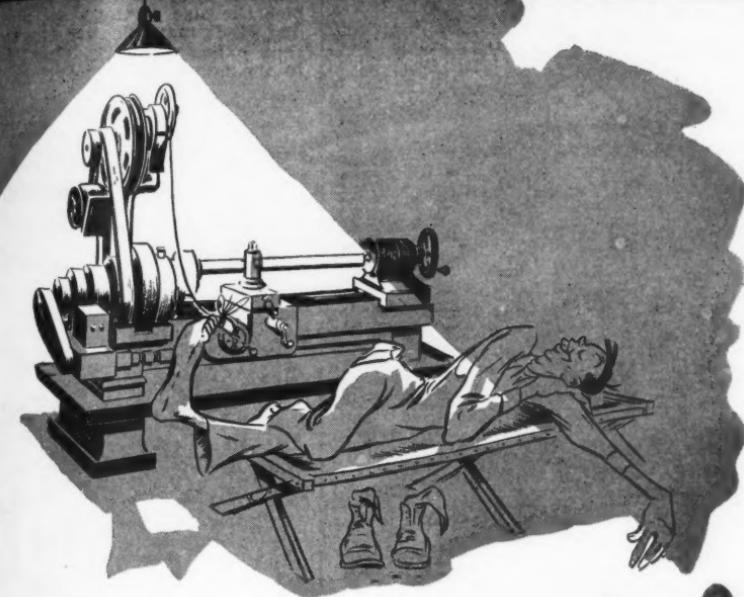
AUBURNDALE, MASS.

us your

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are also
JOE"

by Given



"Finders-Keepers", says Joe!

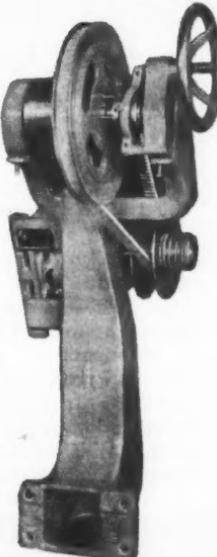
We don't blame Joe for protecting a good thing when he finds it! A Vari-Speed does give more production. It turns spindles on older machines 30% faster, enabling any good operator to use carbide cutters at maximum cutting rate. Gives completely flexible speed control for all diameters, too—another reason why production as much as doubles original machine output when a Given goes on the job!

Table? The Given fits any machine tool by means of various brackets. Installation is easy: drill and tap four bolt holes, bolt bracket in place and the machine tool is ready for operation. Made in 1 to 10 h.p. for all machines.

us your machine tool list for prompt recommendations and ask for descriptive folder and blueprints showing various mounting methods.

Given VARI-SPEED DRIVE

GIVEN MACHINERY CO. • 3855 SANTA FE AVE. • LOS ANGELES



TRINDL
SUPER
INDUSTRIAL
ARC WELDERS

**IMMEDIATE
DELIVERY!**

On all Trindl Welder models on properly extended priority ratings.



**Approved for
High Speed
Production Arc Welding**

Years of careful engineering and "job tested" research have developed these outstanding machines, which are noted for their economy, performance and dependability. Trindl Welders are now manufactured in a range of distinctive sizes to accommodate every type of shop and production welding job. There are Trindl Welders, accessories and supplies for all requirements. Write, wire or phone for detailed specifications and prices.

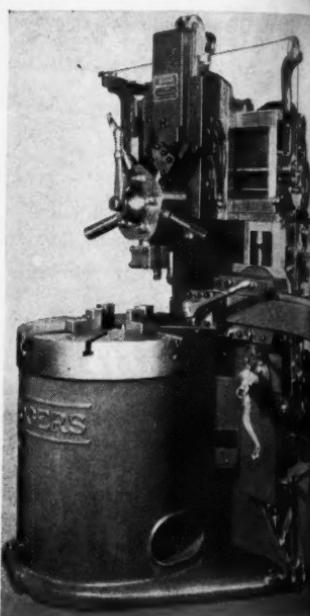
TRINDL PRODUCTS, Ltd.

2227AG Calumet Ave.
CHICAGO • ILLINOIS

fluorescent tubes concentrate a light upon the work to be insulating all outside glare and ows. A large 4-inch lens, which bles the size of the work, provides distorted magnification to both thus exposing many defects not to the naked eye.

**Rogers High Speed "Perfect
Vertical Turret Mill**

Rogers Machine Works, Inc., 12th Street, Buffalo, N. Y., announces addition to its line of "Perfect" M



Rogers High Speed "Perfect 36" V
Turret Mill

tical turret mills of a special high model designed for boring, drilling, turning nonferrous castings and ings in aircraft and similar high high production industries. The drive sheave of the unit operates speed of 760 r.p.m., and the ma has capacity for handling work 36 inches in diameter.

Outstanding features of the B

FORD

The complete line—a right
tool for every filing need.
Write for catalog showing
many shapes and sizes.
J. A. Ford Manufacturing
Company, Inc., 744 W. First
St., Davenport, Iowa.



THE MARK OF A GOOD FILE

FORD

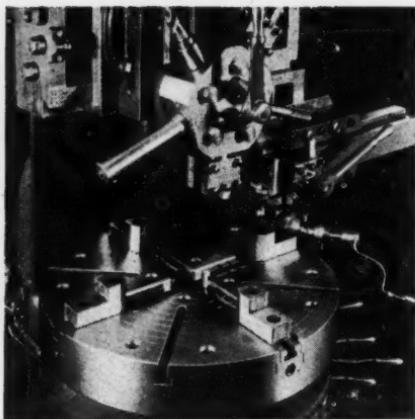
GROUND CUTTERS



ROTARY FILES

Rotary Files—Fast cutting, hard biting tools—made from a special grade of high speed steel. Hand cut by long-experienced craftsmen, then scientifically heat treated to stay sharp longer—and to last longer.

Ground Cutters—Miniature milling cutters, ground from solid after hardening. Special high speed steel stock. Precision ground, economical tools that can be sharpened many times to renew their original keenness.



Close-up view of chuck and main and side head of Rogers High Speed "Perfect 36" Vertical Turret Mill

High Speed Vertical Turret Mill include a swivel side head which can be adjusted at any angle up to 35 deg. each side of vertical to facilitate setting of tools for machining irregular shaped pieces;

built-in graduated dials designed to save time in making setups for original or second runs; and horizontal slide which enables work to be easily and quickly slid into exact position.

Pfaltz & Bauer "Graphicol" Lubricant

Pfaltz & Bauer, Inc., Empire Bldg., New York, N. Y., has placed the market an unusual lubricant product to be known as "Graphicol." This product consists of colloidal graphite suspended in a specially selected grade of lubricating oil. According to manufacturer, the purity of Graphicol tests as high as 99.8 per cent in carbon. Use of the lubricant is said to reduce friction, conserve power, prevent wear and preserve sliding surfaces.

Quaker A.M. Coolant Base

Designated as Quaker A.M. Base, this special soluble coolant base is said to instantly emulsify in cold water in all proportions, forming a solution which is especially useful in metalworking.

New!

TYPE
NT-20

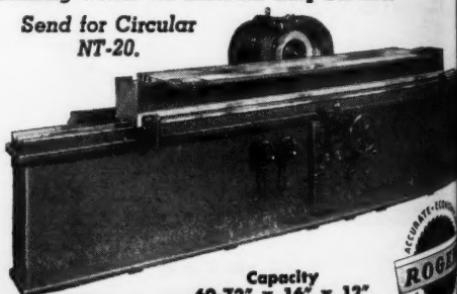
ROGERS
FACE

GRINDER

S. C. ROGERS & CO., 213 Dutton Ave., Buffalo, N. Y.

Specially designed for high production of long, narrow and light work . . . this sturdy traveling table grinder takes work 10" to 12" high. Table length, width 16". A 10 H. P. motor mounts a 20" x 1" grinding wheel for medium duty service.

Send for Circular
NT-20.



Capacity
60-72" x 16" x 12"

ROGERS
MANUFACTURERS OF
ACCURATE-ESPECIALLY

ROGERS GRINDERS

PRECISION QUALITY SINCE 188¹/2

Put more PUNCH in your PRESSES with **MASTERDRIVES**



On punch presses, MASTERDRIVES have high torque, high slip motors to pick up the load without shock. Gear head motors reduce output shaft speed and permit using large pulleys. Automatic belt tensioning device permits preloading belt. You use your present belting, save expense or delays of grooving pulleys or buying new belts. Belt breakage won't capsize drive. Unique upper mounting permits roll feeds or die removal from back of press. MASTERDRIVES ARE COMPLETE drive units. Motor and mounting are engineered, built, and guaranteed as a complete installation. 550 specifications cover practically every machine tool drive requirement.



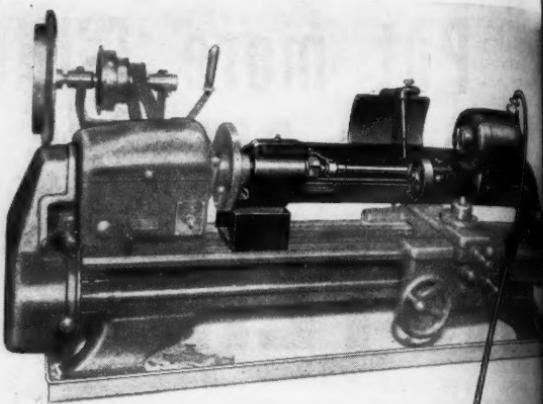
Write today for
complete litera-
ture and name of
your nearest Mas-
ter representa-
tive.

MASTER Electric Company
INDUSTRIAL EQUIPMENT DIVISION • DAYTON, OHIO

ing aluminum sand castings, zinc and aluminum die castings, and soft metal alloys has been placed on the market by Quaker Chemical Products Corp., Conshohocken, Pa.

A clear, claret-colored oil, Quaker A.M. Base is non-alkaline and, according to the manufacturer, cannot injure metal or worker. In addition to keeping work cool, the oil is also said to provide an excellent finish on work and ensure long tool life.

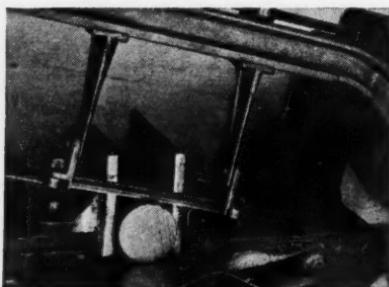
The company is also marketing a concentrated base designated as Quaker A.M. Base No. 11 which, when mixed with light or medium petroleum oil, is said to provide an excellent coolant and lubricant for performing difficult machining operations on aluminum sand castings as well as zinc and aluminum die castings and soft metal alloys.



Prince Lathe Grinding Attachment

Prince Lathe Grinding Attachment

A grinding attachment which can readily adapted to all types and sizes of lathes for use in performing a wide range of precision cylindrical and internal grinding operations, to be known as the Prince, has been introduced by



Special
Containers
for narrow width
coils, 100' length.
Convenient to use.

ATLANTIC Band Saw Blade

Speed Up Metal Cutting Production

Atlantic Metal Cutting Band Saws have been developed through twenty years of research and specialization.

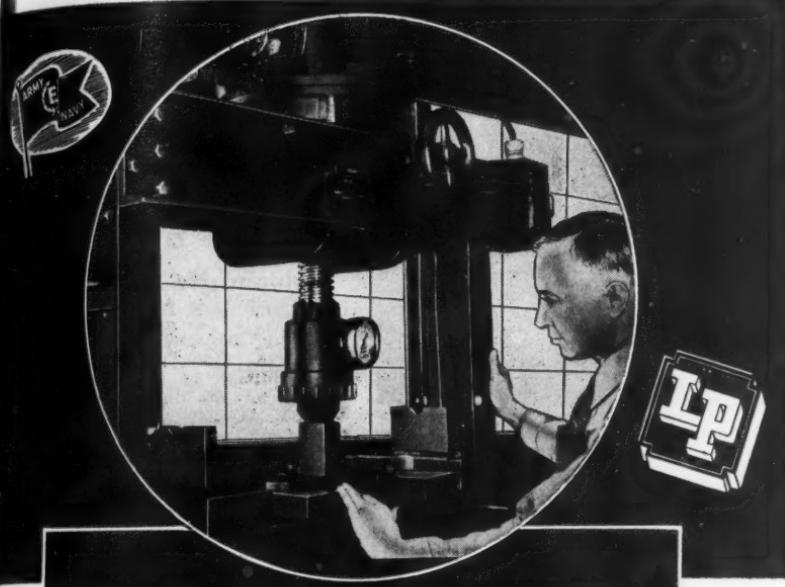
Send for Free
Booklet

ATLANTIC SAW MFG. CO.

Metal Cutting Band Saws
Exclusively

155 Brewery St., New Haven, Conn.





It's American Ingenuity

...that has put Pressurematic Power Presses to work forming dies for .30, .45, .50 calibre bullets ... press-fitting parts for tanks, planes, munitions ... duplicating work pressures on die try-outs ... straightening and bending—and doing many other jobs no one thought of until the war made us think!

Solenoid controls stop ram automatically at any pre-selected pressure—or back ram off work! Fast-acting, too—from 0 to 60 tons in 4 seconds! Movable head; adjustable bolster; foot-pedal controls leave operators hands free. Re-set switch and thermal relays protect motor from overloads. Made in Electric and Hydraulic models.

Prompt Delivery

SEE ONE WORK—MAIL COUPON

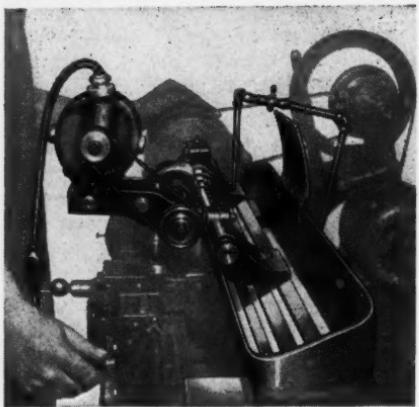
LEMPCO, Dept. MM, Bedford, Ohio
Gentlemen: Tell me plant nearest me where I may see a LEMPCO Press in operation.

NAME.....

ADDRESS.....

CITY..... STATE.....

LEMPCO
PRODUCTS · INC.
BEDFORD · OHIO · U·S·A
ESTABLISHED 1919



End View of Prince Lathe Grinding Attachment
in Operation

Mid-Continent Mfg. Co., 713 Nebraska Street, Sioux City, Iowa. Outstanding features claimed for the attachment include positive control, ease of operation, and rapid setting up.

Available in various models, the Prince Lathe Grinding Attachment is

designed so that the spindle of the tool post grinder can be readily parallel with the work, thus enabling work to be accurately ground. The design of the attachment is also made to make it particularly useful in grinding tapers. The centers of the unit are adjustable for handling any length of work within the capacity of the lathe to which the attachment is applied.

"Lightnin" Heavy Duty Air-Driven Mixers

Mixing Equipment Co., Inc., 104 Son Ave., Rochester, N. Y., announced the addition of three heavy duty air-driven mixers, designated as the Model AG-33, AG-100, and AR-100, to its line of "Lightnin" mixing equipment. Models AG-33 and AG-100 are equipped with gear reduction drives while Model AR-100 features a direct drive. All units are said to be especially suited to the mixing of paints, chemicals, high explosives, and alcoholic products.

According to the manufacturer, the air-driven motors employed in the construction of the mixers cannot be overloaded or burned out even when

SHELDON

Back Geared Screw Cutting PRECISION LATHES

A complete line of full sized, full weight 10", 11" and 12" Precision Lathes—bench, floor and pedestal types built to industrial machine tool standards and specifications. Rigid heavily braced, semi-steel beds with hand scraped ways—2 "V"—ways and 2 Flat Ways. Large hardened steel spindles, ground all over and individually fitted into hand scraped bearings. Each lathe has a full complement of attachments and accessories. Each model gives more lathe per dollar.



See the SHELDON before you buy

SHELDON MACHINE CO., INC.
4280 No. Knox Ave. Chicago, U.S.A.

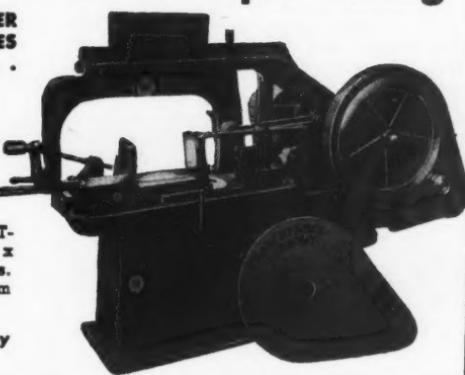


"Lightnin" Heavy Duty Air-Driven Mixer

The Rugged ROBERTSON for Rapid Cutting

THE ROBERTSON ECONOMY POWER
JACK SAWS OFFER MANY FEATURES
IMPORTANT FOR PRODUCTION . . .

- Rugged Simplicity
- Long Life
- High Speed
- Hairline Accuracy
- Few Adjustments
- Large Bearings
- Long Blade Life
- Hydraulic Lift on Back Stroke



The machine illustrated is the ROBERTSON ECONOMY No. 4X. Capacity: 9" x 1". Stroke: 6". Takes 12" or 18" blades. ECONOMY Saws are made in sizes from 6" x 6" to 13" x 13" capacity.

There is a ROBERTSON ECONOMY for every cutting job. Write for information and delivery dates.

**W. ROBERTSON
MACHINE & FOUNDRY CO., INC.**

2 RANO ST.

BUFFALO, N. Y.

AUTOMATIC STAKING MACHINE

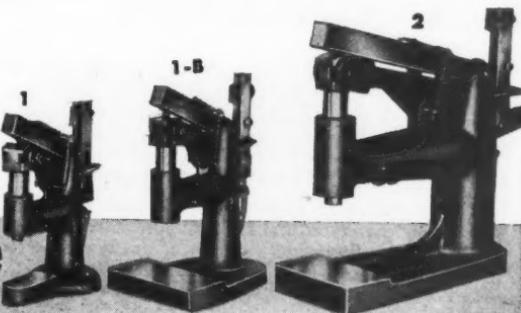
Work that Cannot Be Done on Conventional Riveters

Ideal for riveting movable joints, as blow of trip hammer is always uniform and can be adjusted to hit proper blow for job at hand. Work is held firmly by pressure pad while being struck by hammer.

The most efficient device available for pointing with platinum, tungsten, or silver. Fast and accurate.

1	1-B	2
Stroke	2"	2"
	2"	2½"
Spindle	1"	1"
	1"	1¼"
Throat		
Depth	4¾"	4¾"
	8½"	

Write for folder.



Leber Machine
Corporation

59 RUTTER ST., ROCHESTER, NEW YORK

mixers are operated in unusually heavy liquids. The air exhaust from the motor of each mixer is arranged so as to keep the motor running cool at all times.

All models have a maximum motor speed of 1,800 r.p.m. and are available with shafts and propellers of stainless steel, plain steel, Monel metal, bronze, and other materials. The Models AG-33 and AG-100 are equipped with $\frac{1}{2}$ -inch diameter shafts which are adjustable up to 60 inches in length, and have a maximum shaft speed of 400 and 431 r.p.m. respectively. The Model AR-100 is equipped with a $\frac{5}{8}$ -inch diameter shaft which

is adjustable up to a length of 48 inches and has a maximum shaft speed of 1,800 r.p.m. The Model AG-33 is provided with two 8-inch propellers, Model AG-100 with two 12-inch propellers, and the Model AR-100 with 5-inch propellers. Approximate weight of Model AG-33, 48 lb.; Model AG-100, 50 lb.; Model AR-100, 35 pounds.

Armstrong-Bray Steelgrip Gear and Wheel Puller

Designated as the Steelgrip Gear Wheel Puller, a device for use in quickly removing gears, wheels, and



Armstrong-Bray Steelgrip Gear and Wheel Puller

Gear Specialties

SPURS — HELICALS (14 to 96 D.P.)

BEVELS — (straight and spiral)

WORM GEARING — THREAD GRINDING

This range logically embraces the gear components of many critical control devices essential to the war effort and this organization is proud of its contributions of such material in the program.

With full production capacity scheduled far into the future, all new inquiries are now necessarily subordinated to these vitally important prior commitments. However, every urgent need will be given careful consideration.

Gear Specialties

MANUFACTURERS
CHICAGO

from shafts has been placed on market by Armstrong-Bray & Co., Northwest Highway, Chicago, Ill. Constructed for easily setting up, the vice is equipped with two drop



THOR STAMPS give you more marks per dollar.

Made of correctly-heated alloy steel. Central striking point gives uniform indentation. Thumb side marking makes them easily read — easily used. Write for catalog.

THE PITTSBURGH STAMP CO.

812 CANAL STREET

PITTSBURGH, PA.

h of 48 in
haft spe
AG-33 is p
propellers,
12-inch pr
-100 with
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Model AG
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**Production Goes Up
Production Costs Go DOWN...with
NICHOLSON Expanding MANDRELS**



TYPE A—STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Net Price
1A	$\frac{1}{2}''$ to 1"	\$12.00
2A	1" to $1\frac{1}{2}''$	16.00
3A	$1\frac{1}{2}''$ to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

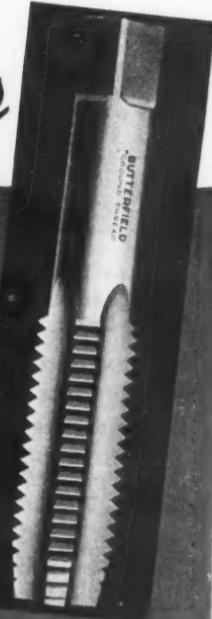
Size No.	Range of Bores Taken	Net Price
1X	$\frac{1}{2}''$ to $\frac{9}{16}''$	\$10.00
2X	$\frac{15}{16}''$ to $2\frac{1}{32}''$	11.00
3X	$2\frac{1}{32}''$ to $\frac{3}{4}''$	12.00
00	$\frac{3}{8}''$ to $\frac{7}{8}''$	14.00
0	$\frac{7}{16}''$ to 1"	16.00
1	$\frac{1}{2}''$ to $1\frac{1}{4}''$	18.00
2	$1\frac{1}{4}''$ to $1\frac{15}{16}''$	21.00
3	$1\frac{15}{16}''$ to 2"	29.00
4	2" to $2\frac{1}{2}''$	40.00

(Other Sizes Taking Up to 7" Bores) Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

W. H. NICHOLSON & CO., 136 OREGON ST., WILKES-BARRE, PA.

Butterfield Taps

Where thousands of tapped holes must be produced day after day to a tolerance of .001 of an inch — specify "BUTTERFIELD" Commercial Ground Taps.



UNION TWIST DRILL CO. BUTTERFIELD DIVISION

Factories: DERBY LINE, VERMONT, U. S. A.
Athol, Mass.; Mansfield, Mass.;
Rock Island, Quebec, Can.

Stores:

2340 SUPERIOR AVE.
11 S. CLINTON ST.
4540 ANTOINE ST.
81 READE ST.

UPTON
CHICAGO
PHILADELPHIA
NEW YORK

heat-treated rigid steel arms which are designed with sufficient hook length to grip gear or wheel firmly, thus eliminating slippage. Cap screws and straps are also made of heat-treated steel. The forcing screw, which is hardened for strength, is provided with fine threads and is pointed on the end.

The Armstrong-Bray Steelgrip Gear and Wheel Puller is available in various sizes for handling gears, wheels, and so on, up to 12 inches in diameter and with maximum reach of 16 inches from end of shaft.



"Square" Quality Surface Plate

"Square" Quality Surface Plates

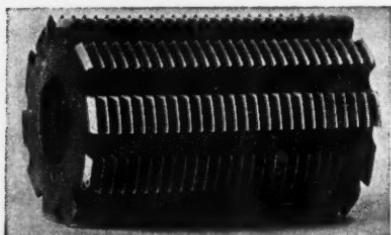
Square Surface Plate & Tool Co., 221 N. Main St., Royal Oak, Mich., has placed on the market a line of quality surface plates of unusually rigid, accurate, and strong design. The plates are made of fine grain alloy cast iron containing 1 per cent chrome and 25 per cent steel, are carefully normalized and uniformly hardened, and feature a generous machined clamping space on all sides.

"Square" Quality Surface Plates are available in sizes from 12 x 12 to 96 x

144 inches with either planed or scraped surfaces. Wooden covers are furnished with all plates, which can be resurfaced if desired.

Acro "Kutrite" Milling Cutter Grinding Fixture

Acro Tool & Die Works, Dept. A, 5324 N. Kedzie Ave., Chicago, Ill., announces a milling cutter grinding fixture to be known as the "Kutrite." According to the manufacturer, the fixture, which is made of hardened ground steel, is designed to accurately position milling cutters, as well as circular saws, gear cutters, and other cutting tools, on surface grinders, simplifying



MULTIPLE THREAD MILLING HOBS

—in any thread system, any thread angle, any thread form. Inch or metric scale. Left or right hand threads. Free from distortion. Up to 7" O.D. and 4" thread length for internal or external threading.

**TOLERANCES: CUT ON MACHINES ADJUSTABLE FOR TOLERANCES UP TO 1/10,000
ALL HOBS DEMAGNETIZED RELIEVING CHIPS IMMEDIATELY**

These hobs precision cut by methods used for more than 25 years, eliminating any discrepancy between thread form and form of finished work, thus speeding up production without sacrificing accuracy. Full details upon request to Dept. T. Delivery Time: From 1 Week On.

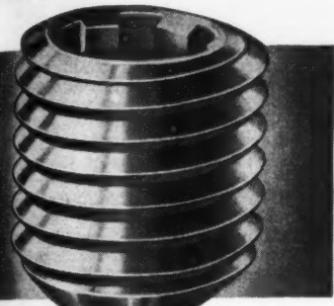
FOR QUICK ACTION CALL PLANT AT CLINTON, INDIANA, TELEPHONE 85.

U. S. MACHINE TOOL MFG. CORPORATION
100 SO. 6TH STREET

TERRE HAUTE, IND.

There's What Aircraft Equipment
Manufacturers* Are Specifying For
Compact, Vibration-Proof Assembly

BRISTOL MULTIPLE-
SPLINE
SOCKET SET **SCREWS**



**SET FASTER!
EASIER!
TIGHTER!**

SPECIFIED by leading manufacturers of aircraft parts, aerial photographic and electrical communications equipment.

AND HERE'S WHY

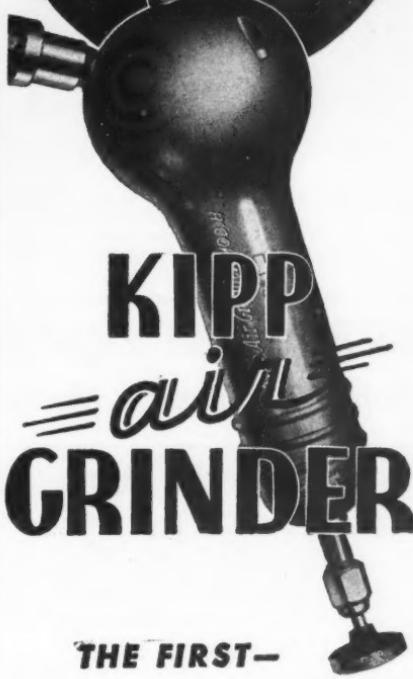
- 1 Spines, like gears, provide faster, easier transmission of rotary power.
- 2 Spines permit tighter setting, without splitting or rounding out even smallest sized sockets.
- 3 Tighter setting means maximum resistance to vibration in fast-moving parts.
- 4 Spines "grip" wrench, make tightening easy in awkward places, prevent wrench slippage.
- 5 Spines permit removal without damage to socket.

INVESTIGATE!

See THOMAS' REGISTER
for Complete Facts, List of
Product Applications.



27 BRISTOL ROAD, WATERBURY, CONNECTICUT



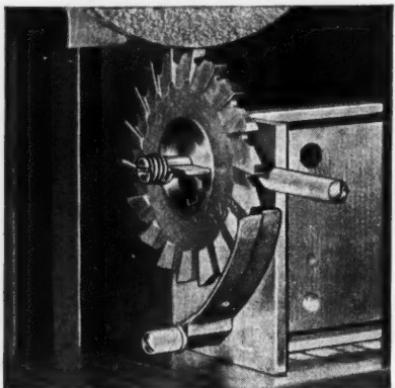
THE FIRST—
*and always the old reliable
High Speed Air Grinder for Tool
Rooms and Production Work!*

MADISON-KIPP CORPORATION

208 Waubesa Street, Madison, Wisconsin, U.S.A.

ing otherwise high skill grinding operations.

By means of the Kutrite Fixture, both



Acro "Kutrite" Milling Cutter Grinding Fixture

the ends and sides of cutting surfaces of tools can be quickly and accurately ground. Adjusting rods located on the fixture permit quick setting for proper angles.

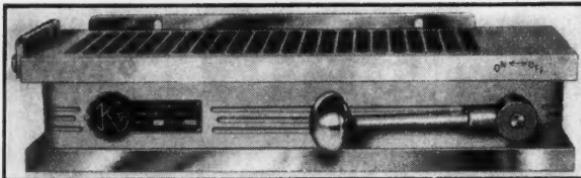
Castolin "Durface" Low-Temperature Welding Alloy

Known as Castolin "Durface," a low temperature welding alloy designed for use in the rebuilding of parts and equipment worn through friction, abrasion or mild impact is announced by Electro Welding Alloys Co., 40 Worth St., New York, N. Y. This alloy, which consists of a ferrous base alloyed with hardening elements such as nickel, molybdenum, and so on, is also said to be useful for general maintenance and averaging work and can be applied to manganese steel, alloy steel, cast iron and malleable iron.

Durface is available in two grades: Grade No. 1 for gas torch application and Grade No. 2 for a.c. and d.c. application. Grade No. 2 is supplied with a chemical coating while Grade No. 1 is furnished bare. Durface Grade No. 1 has a Brinell hardness of 450 to 500 and tensile strength of 50,000 lb. per square inch. Durface Grade No. 2 has a Brinell hardness of 575 to 675 and tensile strength of 50,000 lb. per square inch.

Features of Castolin Durface Welding Alloy include rapid and homogeneous flow, high alloying effect, unusual resistance to wear, ease of application, low temperature melting point, and so on.

KAR Permanent Magnet CHUCKS Hold Work Tight... Release Easily



Top plate of a Kar Chuck is constructed of a series of identical pole pieces, uniformly separated by gaps formed by non-magnetic metal, into which pole pieces are cast. Gaps between pole pieces are small at work surface but open out to a width greater than that of magnetic elements at lower surface of top plate. Therefore, when magnetic elements are shifted from work holding position to release position, flux path is broken, as shown by arrows, and work is released.

AVAILABLE FOR IMMEDIATE DELIVERY FROM STOCK.



THE KAR ENGINEERING CO., INC.
GREAT BARRINGTON

MASSACHUSETTS

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cation, lo-
and so on.

The Everede Boring Bar Holders are adjustable to various size lathes. (Bushings are furnished with each boring bar for use in the Holders.) Everede Holders keep the boring bar in a horizontal position, regardless of any change in the size of the hole, within limits. • The No. 1 Holder for lathes from 7" swing to 9". • The No. 2 Holder for lathes from 8" swing to 12", and the No. 3 Holder on engine lathes from 12" swing to 24".

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All sizes—all shapes. Write for catalog.



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January, 1943

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**A Warning Light
Should Not Be
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**DUST BREATHING
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**LEIMAN BROS.
DUST COLLECTOR**

**Individual Motor-
Driven Units**

For

**SURFACE GRINDERS
DOUBLE END GRINDERS
SAWS, SANDERS, ETC.**

**LEIMAN BROS. INC.
165-1 Christie St.
Newark, N.J.**

Despatch High Temperature Acid-Resistant Alloy Steel Fans

A line of high temperature acid-resistant alloy steel fans which are designed to be suited to virtually all heavy duty high volume requirements involving temperatures up to 1,600 deg. F. is now being offered by the Despatch Oven Co., Minneapolis, Minn. Outstanding features include rigid design and precise balancing to assure smooth and quiet operation under widely varying conditions.

The fans are available in 11 standard



Despatch High Temperature Acid-Resistant Alloy Steel Fan

sizes with wheels ranging from 12 to 48 inches in diameter and with capacities up to 20,000 c.f.m. All sizes are belt driven and are designed so that the belt can be arranged in 16 standard positions. The shaft of each unit is supported on two large bearings which are air cooled. Fan wheel, shaft, and so on can be easily removed without disturbing the housing.

Despatch Acid-Resistant Fans are welded construction throughout. Panels, sides, and scroll sheets are made of heavy gauge metal having strong reinforcing angles. Other parts are made to be of equally durable and rigid construction to minimize vibration and to withstand severe heat and load conditions.

The fans are available made of various

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REG. U.S. PAT. OFF.
Tool and die shops have their Gremlins, too, but MARQUETTE Welders will stymie their favorite tricks.

All sorts of tools, dies, jigs and fixtures can be fabricated much faster and with less critical material when welded. And you avoid the drilling, tapping, doweling and machining where the pesky Gremlins get in their most troublesome vexations.

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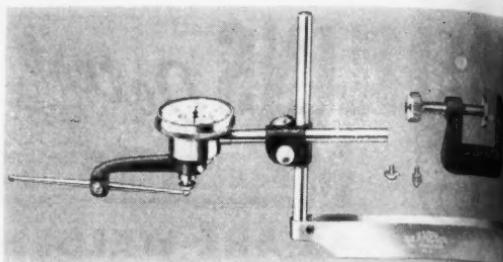
Ames Universal Test Indicator No. 22A

ous alloy steels, including 18-8, 25-12, Monel, Inconel, and so on, for handling chemical gases, fumes, vapors, foundry dust, furnace and oven heats, pickling tank exhausts, and so on, at high temperatures.

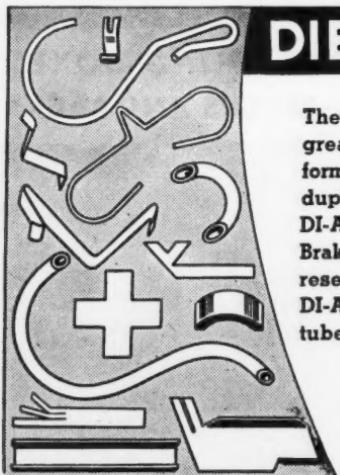
Ames Universal Test Indicator No. 22A

Manufactured by the B. C. Ames Co., Waltham, Mass., the Ames Universal Test Indicator No. 22A shown in the accompanying illustration is designed for use in performing a variety of testing operations. The unit is said to be easy to set up and adjust, and, by means of hole attachment, can be used to test internal surfaces and hard-to-get-at areas.

The complete set includes a No. 101H indicator which is $1\frac{1}{2}$ inches in diameter, is graduated in thousandths of an



inch, and has a range of 0.100 in three hardened and ground contact points of different lengths; 3 $\frac{1}{2}$ -inch long x $\frac{1}{4}$ -inch diameter indicator holding rod; hole attachment which is designed to fit the 0.375-inch diameter stem of the indicator and can be used with holes up to $1\frac{1}{2}$ inches deep; top post holder which is 6 inches long x $\frac{1}{4}$ inch thick x $\frac{3}{4}$ inch wide and is hardened; 5-inch long x $\frac{1}{8}$ -inch diameter upright spindle; sliding swivel with $\frac{1}{4}$ and $\frac{5}{8}$ -inch diameter holes; and a clamp having threaded hole for upright spindle. All parts are furnished packed in an attractively finished wooden box with slide cover.



DIE-LESS DUPLICATING

The parts shown are typical of the great variety of simple or intricate forms and shapes which can be quickly duplicated to a tolerance of .001" with DI-ACRO Precision Machines—Shears, Brakes, Benders. For experimental and research work or production runs, DI-ACRO Units form angle, channel, tube, rod, moulding, wire, strip stock; shear stock sheets; trim duplicated stampings. With DIE-LESS DUPLICATING, MAN HOURS and CRITICAL MATERIALS are regularly saved.

WRITE FOR CATALOG—Send today for new 32-page catalog—"Metal Duplicating Without Dies"—giving full information on the capacity of DI-Acro Shears, Brakes, and Benders and illustrating their great variety of applications.

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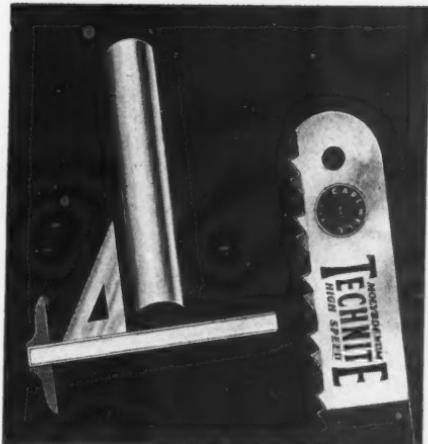
This new inspection device is desirable wherever close inspection of tools and parts is necessary.

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S. LOWE & SONS CO.

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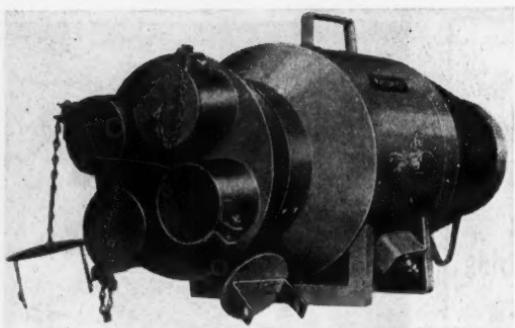


*Capewell Precision
Cutting SAVES
Machining TIME*

After investigating blades for a job of simultaneously sawing nine manganese bronze bars, this shop chose Capewell. These hack saw blades, because set with uniform tolerance, are making a reputation for precision cutting. This means savings in stock, and savings in subsequent machining. Investigate Capewell for yourself.

The Capewell Mfg. Co.,
Hartford, Conn.





Chelsea "Octopus Jr." Portable
Exhauster and Blower

Chelsea "Octopus Jr." Portable Exhauster and Blower

In response to a number of requests for a small portable unit for use in eliminating gases, fumes, and so on, from closed-in places, such as shipyards, welding rooms, and so on, the Chelsea Fan & Blower Co., Inc., 1206 Grove St., Irvington, N. J., has placed on the market a powerful exhauster and blower to be known as the "Octopus Jr." The unit is powered by means of a $\frac{3}{4}$ h.p. ball bearing motor and is equipped with

heavy steel wheels on which it can be moved from place to place. Designed to suck or blow 2,000 cubic feet of air per minute, the unit can be operated in any position and is said to weigh but 70 pounds.

The Chelsea Octopus Jr. Portable Exhauster and Blower is equipped with adapters for three 4-inch nozzles or four 3-inch nozzles for flexible hoses. Caps are provided for closing

the nozzles when not in use. Each 4-inch metal hose is said to exhaust 250 cubic feet of air per minute and each 3-inch hose, over 200 cubic feet of air per minute.

"Rubberflex" Bushing

Designed to conserve rubber, a rubber-insulated bushing capable of absorbing vibration and shock and of handling torsional and radial movements without lubrication, to be known as

WIZARD

ELECTRIC COUNTERS

Count anything from shadows to box cars — parts, cans, cases, bottles.

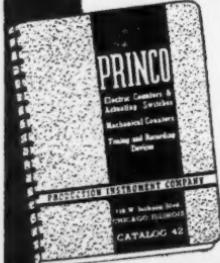
Current draw only 4 Watts — 600 counts per minute — continuous duty coils — all working parts enclosed.

May be located at any distance from actual source of count. Actuated by any suitable switch, relay, or photo-electric unit.

Built for heavy duty industrial service. Quick deliveries on high priority orders.

Counting Problems Solved!

Our extensive experience is available to users in applying Counters. For suggestions, just tell us what you want to do.



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Manufacturers of Counting, Timing and Recording Devices

" Portable
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SURFACE PLATES

which combine

- STRENGTH
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Available in sizes 12" x 12" up to
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SQUARE SURFACE PLATE &
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DON'T BLAME THE TAP!

Blame the Holder!

If holes are inaccurately tapped, the fault frequently is not with the tap itself, but is the result of spindle misalignment. The same applies to reaming. Oversize or bell-mouthed holes are the inevitable result of spindles being out of alignment with the work. Instead of condemning the tools, try a different type of tool holder—a Ziegler Floating Tool Holder that automatically compensates for spindle misalignment. You will be amazed at how it will solve your difficulties.

W. M. ZIEGLER TOOL CO.
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FLOTTING
HOLDER
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W-S Standard Reamers with carbide tips.
Tapered shank (illustrated) and straight
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STANDARD REAMERS available from stock

REAMERS and many other cutting tools, formerly in the "special" class are now STANDARD with us. The majority of these STANDARD cutters is in stock most of the time. Our broad line often enables the consolidation of tool orders and saving of valuable time. Each W-S tool is genuine CARBOLOY tipped. The grade used is the one best suited to do a cutting job on the metals for which the tool was ordered. (Other brands of carbide can be specified.) Carbide tipped tools are not just a specialty with us... we make them exclusively. You can expect and get uniform, high quality results with W-S tools. Write for new FREE Catalog 942 and latest prices. WENDT-SONIS COMPANY, HANNIBAL, MO.

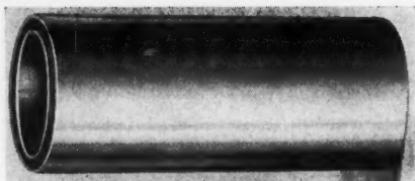
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in straight and
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Sizes: $\frac{1}{8}$ to 1-1/2".



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BORES • SPOT FACERS • END MILLS • REAMERS
HOLLOW MILLS • LATHE BITS • SPECIAL TOOLS



"Rubberflex" Bushing

"Rubberflex," is now being manufactured by Bushings, Inc., 3447 W. Eleven Mile Ave., Berkley, Mich. Available in a wide range of sizes and capacities, the bushing consists of a very thin rubber cylinder which is inserted between two metallic cylinders. The rubber cylinder is held between the inner and outer metal cylinders entirely by the elasticity of the rubber itself.

M.S.A. "Fend" for Industrial Dermatitis

A line of industrial skin creams and lotions for barrier protection of worker's skin against industrial dermatitis,

to be known as "Fend," has been placed on the market by Mine Safety Appliances Co., Braddock, Thomas and Main Sts., Pittsburgh, Pa. According to manufacturer, these products consist of cosmetically-safe materials, are easy to apply, are bland and neutral, offer no interference with the normal action of the skin glands, are emollient to the skin, and can be readily removed with mild soap and warm water.

Each of the six different types of products available is said to provide protection against a number of specific skin hazards.

Service Hydraulic Crane with Revolving Boom

The Service Hydraulic Crane with Revolving Boom illustrated herewith, product of the Service Caster & Truck Co., 440 Somerville Ave., Somerville, Mass., is especially designed for lifting heavy grindstones and placing them in grinding machines. The unit, which has a capacity of 250 lb., can also be used for a variety of other purposes.

The crane has an overall height of 98 inches and is equipped with two 6-inch rigid wheels and two 6-in-

WHY?
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YOUR EYE CAN DETERMINE MICRO-INCH MEASUREMENT

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* In conjunction with your gage blocks, Acme Optical Flats and Monochromatic Lamp make light-wave measurements simple and easy.

Where glass optical flats are used to determine surface flatness, or where they are used for comparison measurement in connection with precision gage blocks, light of a single wavelength is required. This is provided by the Acme Monochromatic Lamp. Its large, bright working field avoids the necessity of exact placement of the work, and makes inspection easy and fast. Interference bands can be seen on a relatively dull surface or through an appreciable air gap. This decreases scratching and wear of your glass flats as it is unnecessary to rub them down on the work to squeeze out the air film.



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FOUR STANDARD
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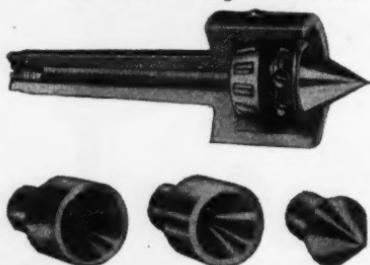
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On lathes, millers, grinders, etc.



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Produce more work quicker, because they permit machines to be run at capacity. Save set-up time. 3 interchangeable inserts to meet the needs of all centered and uncentered work. Fitted with high precision radial ball bearing and tapered roller bearing.

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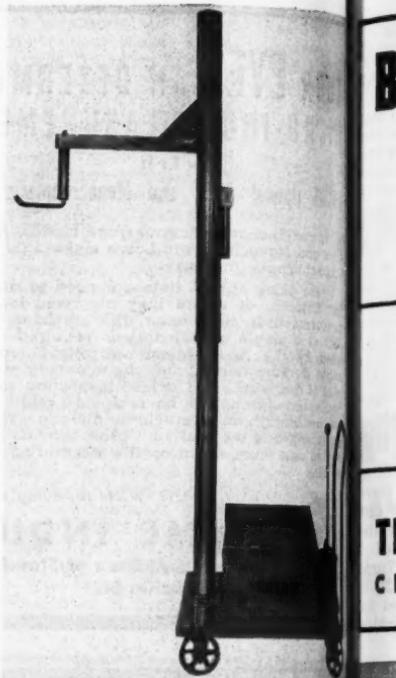
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Service Hydraulic Crane with Revolving

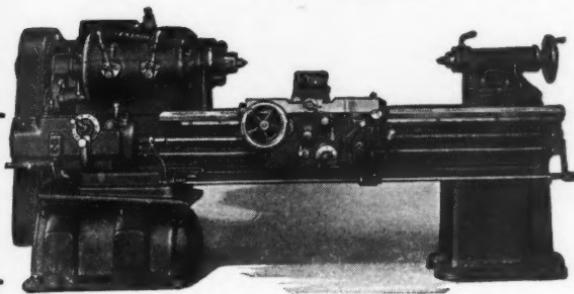
swivel casters. The boom is provided with a travel of 36 inches and may be revolved 360 deg. Raising of the boom is accomplished through a lever for lowering, by means of a control valve at the front of the crane.

Salsbury Turret Truck

A fully automatic clutch and no shifting transmission are two outstanding features of the Salsbury Turret Truck, an industrial power truck adaptable in lift, cargo, and tractor type which is now being marketed by the Nutting Truck & Caster Co., Faribault, Minn. An additional feature of the truck is an engine-over-drive wheel power assembly contained within a turret.

Steering is done with the drive wheel, which provides unusual maneuverability. The main frame of the power plant is rotably mounted in ball bearings, thus permitting steering in any direction through an arc of 360 deg.

BOYÉ & EMMES ENGINE LATHES



THE BOYÉ & EMMES MACHINE TOOL CO.
CINCINNATI • OHIO

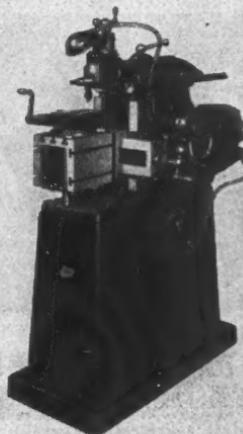
8 inch Hy-Duty Shape-Rite Shaper

P-R-E-C-I-S-I-O-N

Precision is the one most important requirement in war work . . . and Precision is an outstanding quality of the Shape-Rite Shaper. Better investigate our Shape-Rite, before you buy a shaper. See your dealer or write us for specifications.

Sales Service & Mfg. Co.

111 N. Cleveland Avenue Saint Paul, Minnesota
U. S. A.



Salsbury Turret Truck



reverse the direction of travel, the operator simply reverses the turret and drive wheel in one and the same motion. The power turret is a completely independent unit which is easily removable for servicing.

The Salsbury Lift Type Turret Truck features an exclusive articulated de-

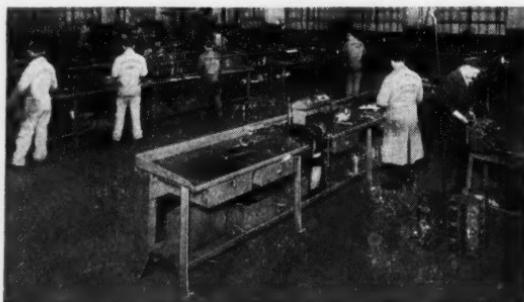
sign which is said to keep loads practically level even when moved over sharp dips, steep ramps, and unsmooth travel surfaces, thus eliminating danger of spilling or dumping.

The power plant of all type truck consists of a single cylinder four-cycle air-cooled engine designed to provide a maximum speed of 8 miles per hour under factory rated loads. The self-shifting transmission on each unit is entirely automatic and provides infinitely variable drive ratios between 60 to 1 in "low" and 20 to 1 in "high." Drive

ratios are entirely controlled by travel speed. The automatic clutch of each truck engages as engine is accelerated and disengages when engine is idled.

The three types of Salsbury Turret Trucks are designated as the Model SLT (lift type) with foot-operated hydraulic lift for picking up loaded skips.

Where more work-benches will help your output...get



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SHOP EQUIPMENT

1367 "Hallowell" ready-made bench combinations provide a choice of the right bench for every job. Various heights, widths, lengths.

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Street Truck



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Manufactured by

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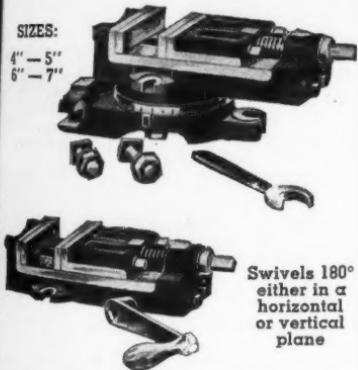
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Milling Machine Vises

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4" - 5"
6" - 7"



Swivels 180°
either in a
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JOHN B. STEVENS INC.
482 Canal St.
New York, N. Y.

An advertisement featuring a large headline "Modern Tools for the NEW WORKERS". Below the headline is a black and white illustration of three workers in a workshop environment. In the foreground, a hand holds a large wrench. At the bottom of the page, there is a collection of various tools including wrenches, a screwdriver, and a hammer, all arranged on a dark surface.

New Workers Need New Tools
Modern in design — strong — light — durable. Walden-Worcester in its long years of experience has always been a leader in making hard jobs easier by engineering its tools on the drafting board and testing them on the workbench. Don't buy heavy, clumsy tools when Walden - Worcester Tools are available.

STEVENS WALDEN, INC.
473 SHREWSBURY STREET

WORCESTER, MASSACHUSETTS, U. S. A.





Model SCT (cargo type) with platform for carrying tools, parts, boxes, and so on, and Model STT (tractor type) for pulling trailer trains.

Dennison Greaseproof Ordnance Wrapping Paper No. 1A-35

Known as Dennison Greaseproof Ordnance Wrapping Paper No. 1A-35, a crepe paper especially designed for use in wrapping ordnance parts so as to protect them from corrosion during shipment or storage has been developed by the Dennison Mfg. Co., Framingham, Massachusetts.

Said to meet the greaseproof paper requirements given in the Ordnance Field Service Packaging Manual, the No. 1A-35 paper has many outstanding wrapping qualities, the most important of which is its limp, dead-fold quality. This limpness, augmented by the characteristic pliability of crepe paper helps

Machine Parts Unwrapped and Wrapped in Dennison Greaseproof Ordnance Wrapping Paper No. 1A-35

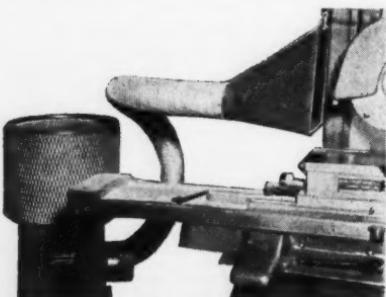
it to form and stretch easily around corners and edges with reduced risk of tearing or puncturing, thus making the paper unusually effective for wrapping small irregularly shaped objects such as individual engine valves, gun parts, gears, and so on. The wrapping is said to mold to a given shape covering every corner and crevice.

The resilient quality of Dennison Greaseproof Paper No. 1A-35 provides for unusually long life. Even after many wrappings, the same piece of paper is said to remain pliable and un-torn, thus reducing rewrapping costs to a minimum and also allowing parts to be inspected without damage to wrapping.

Kennametal Clamped-On Tip Tool

McKenna Metals Co., 300 Lloyd Ave., Latrobe, Pa., now has available a Kennametal Clamped-On Tip Tool for use in machining steels. The tool illustrated is designated as the Style 51. An opposite hand type is designated as Style 52.

The clamping action for the tip is obtained by means of a screw which is inserted from the bottom of the tool through the shank to the top of the clamp, thus eliminating the need for any mechanical device at the top of the clamp which might hinder the most efficient



STOP DUST from GRINDERS with DUSTKOP

LOW COST DUSTKOP collects dusts from Surface Tool and Precision Grinders . . . Compact, self-contained $\frac{1}{4}$ hp motor and fan . . . Easily renewable spun-glass filter cleans and returns air to room. Saves heat. Prompt deliveries of standard units on high priorities. Write for Bulletin A-500.

AGET-DETROIT MFG. CO.
2046 Book Tower CA. 3090 Detroit

G I L M O R E

GILMORE DIAMOND TOOLS in WAR PRODUCTION

War Production Plants are constantly raising their standard of precision work, and, this in turn, calls for better quality Diamond Tools.

Thousands of these superior diamond tools are made and regularly delivered to our customers as promised.

We have greatly increased our diamond working machines, our gauges and other production tools, all of which enables us to extend this diamond tool service to help solve your precision grinding problems.

F. F. GILMORE & CO.

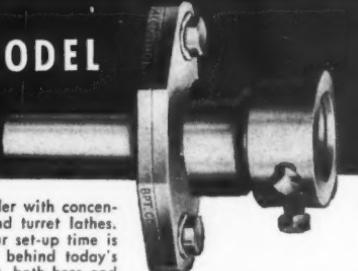
Manufacturers of Diamond Tools

285 Columbus Avenue
Boston, Mass.

2834 E. Grand Blvd.
Detroit, Michigan

D I A M O N D S

ALCO RELEASING MODEL BUTTON TYPE DIE HOLDER



... presents a revolutionary improvement in a releasing type holder with concentric alignment for button dies for use on hand screw machines and turret lathes. There's room for improvement in the work you are doing—if your set-up time is lagging higher than it should—and if your production is lagging behind today's tempo, we assure you that ALCO Tools are playing a big part, both here and in England, in getting top speed out of every thread cutting operation.

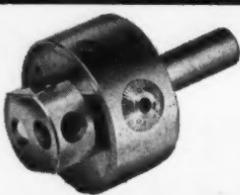
This latest addition to the ALCO line incorporates all the time-tested features of the now famous ALCO drill chucks and tap and die holders PLUS rigid construction and solid clutch drive for this releasing model. Will cut left or right hand threads equally well without any internal changes in the mechanism—longer die life, quicker set-up, perfect threads on each piece and throughout the run.

Write Alco your particular thread cutting problems. Send for the latest Alco catalog illustrating the complete line of Alco holders for screw machines, both old and new.

EFFICIENT
ALCO TOOLS

THE ALCO TOOL COMPANY

152 BIRDSEYE ST., BRIDGEPORT, CONN.
Detroit Office — 908 Stephenson Bldg.

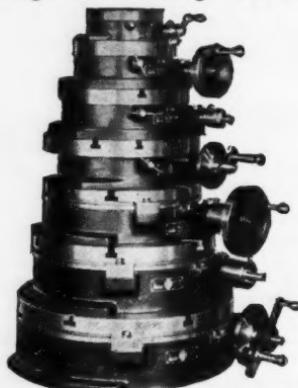


Micrometer **FRAY** OFFSET BORING HEADS

Offsets $\frac{1}{4}$ "—Head $2\frac{1}{2}$ " overall.
 Micrometer Dial 50 divisions—.001".
 Three Tool Holes—one hole runs true with
 arbor.
 All parts nickel-chromium steel, SAE 3140.
 Two $\frac{1}{4}$ " Boring Bars fitted with H.S.
 Tool Bits and Three Wrenches with each
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*Manufacturers of "All Angle"
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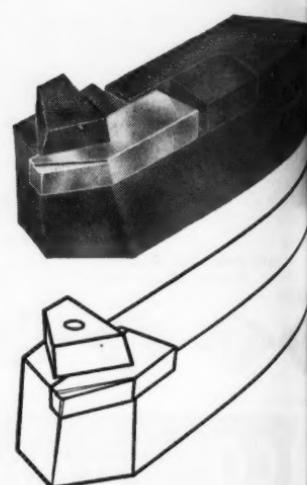


Sizes 9", 12", 15", 18"
 Ask your dealer or write us for
 eight page catalog.

ALFRED A. TROYKE
 4422 Appleton St. Cincinnati, Ohio

ficient use of the tool. A flat slot is milled out of the tool shank to accommodate the cutting tip which is held firmly in position by the clamp.

The clamp should not be used as a chip breaker. Where a chip breaker is desired, it should be ground in the slot. As the tip is reground following use, it is moved forward and out from under the clamp, shims being placed behind it. When the tip becomes too small for service in the tool, it frequently can



Kennametal Clamped-On Tip Tool

brazed into a small shank for light turning or boring operations.

The Kennametal Clamped-On Tool is available in three square sizes of 1 , $1\frac{1}{4}$, and $1\frac{1}{2}$ inches and two sizes of $1 \times 1\frac{1}{2}$ and $1\frac{1}{2} \times 2$ inches.

Towmotor Lift Truck with Cradle Arm Attachment

Designed to speed the handling of heavy motors, castings, production machine parts and other loads, a lift truck with a cradle arm attachment has been developed by the Towmotor Co., 1226 E. 152nd Street, Cleveland, Ohio. With the unit, loads are said to be quickly raised from the floor for carrying, moved rapidly through narrow aisles and up ramps, and maneuvered into position with a minimum of labor.

A flat shank which is
be used to
allowing
placed be
uently can



SHOP BOX (Straight Side)

A Straight Side Shop Box with drop handle at each end. Excellent for general use where stacking feature is not required.



STACKING BOX

An ideal all purpose shop box. Sturdy all welded construction. Skids act as positive locking lock and re-inforce box at point of maximum wear.

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Immediate
Shipment!

No. 201—
6" x 9" x 3½"—20 ga. 40c Ea.

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F. O. B. Factory, Philadelphia

**AMERICAN
METAL WORKS, INC.
1501 GERMANTOWN AVE., PHILADELPHIA, PA.**

Tip Tool
for
bed-On
square
and two
inches

NEW!



MODEL SP400

BRADY-PENROD SELF-PRIMING CENTRIFUGAL COOLANT PUMPS

"They Pump Air"

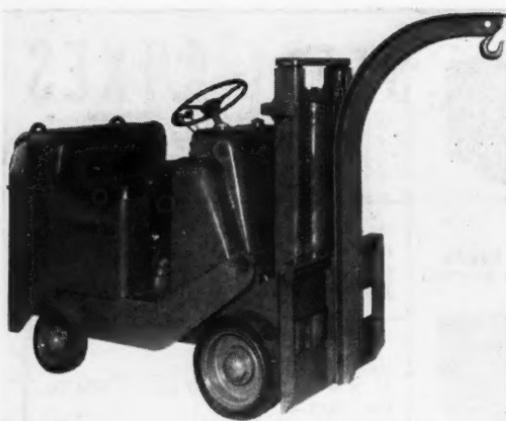
through clever application of the fundamental principle
Patent No. 2,164,869, these pumps are simple in design,
strongly dependable and instantly self-priming on normal
suction lifts encountered with machine tools. Model
SP400 is sturdily built, with all the superior BRADY-
PENROD features, to handle abrasives and steel chips.
easily installed on present machines or quickly adapted
new machines.

Send for FREE Bulletin

BRADY-PENROD, INC.

1208 W. Second Street, Muncie, Indiana

January, 1943



Towmotor Lift Truck with Crane Attachment

Matthews "Champion" Interchangeable Steel Type Holder

The illustration shows the "Champion" Interchangeable Steel Type Holder which has been added to the line of stamping devices offered by James Matthews & Co., 3942 Penn St., Pittsburgh, Pa. A feature of the holder is the ease with which it can be converted for use in a press for production stamping of all types

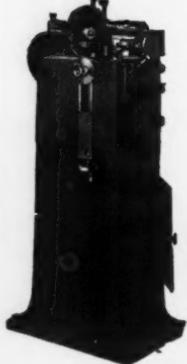
products or for use with a hammer, pending upon the marking application. For hand stamping operations, the removable head is placed over the shank held in place by means of a set screw located at the side of the head. In press stamping operations, the head is removed and the shank is clamped

The crane arm attachment may be used either with or without forks. It is quickly demountable and interchangeable with standard forks so that the Towmotor on which it is used can be readily adapted to special handling assignments without interrupting the regular flow of materials.

Automatic Metal Saw Grinder and Retoothers

MODEL IC

PRECISION
and
ACCURACY
AUTOMATICALLY
ASSURED

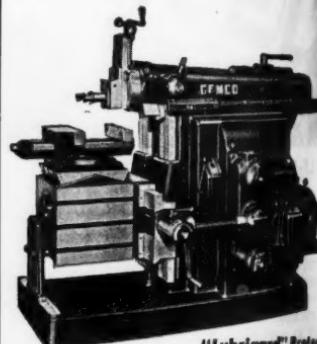


For metal cutting saws 2" to 14" in dia. When specified, saws as small as $\frac{3}{8}$ " dia. and $\frac{1}{8}$ " to 2" spacing. Also supplied as a Combination Grinder for circular, band and hack saws.

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The Wardwell Mfg. Co.
3166 Fulton Rd. Cleveland, Ohio

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WHITNEY - JENSEN
 BENCH TYPE
 PRESS BRAKE



A new machine, designed for moderate-sized work in jobbing and production shops. Welded steel frame, stroke adjustment 1", throat depth 6", 1 H.P. motor, 72 strokes per minute. Bed 18" long. Floor stand available if desired.

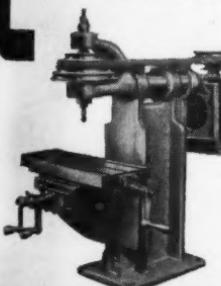
Whitney Metal Tool Co.
 110 FORBES ST.
 ROCKFORD, ILL.

**PRECISION BENCH
 MILLER**

Tapered Roller Bearings

for high-speed production or precision tool room work. Tool direction adjustable to 60 degrees each side of center.

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for Sharpening
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Capacities: No. 2 Machine Screw to 1½" Hand Taps — 2 to 10 flutes—right and left hand taps —possible by selection of proper heads.

All taps can be held by shank in precision collets, can be sharpened after center is destroyed.

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HENRY P. BOGGIS & CO.
 1279 W. 3rd ST. CLEVELAND, OHIO



Matthews "Champion" Interchangeable Steel Type Holder

an aperture in the press equipment.

The Champion Type Holder is recommended for 90 per cent of all heavy or medium duty marking applications requiring continuous use of marking tools. The holder can be made for any desired type capacity. For light duty marking, which includes the marking of wood,

brass, and other soft materials, characters up to $\frac{1}{4}$ inch in size are recommended. For medium duty marking which includes marking of cold rolled steel, carbon steel, and so on, characters up to $\frac{3}{8}$ inch in size are recommended. For heavy duty marking, which includes deep marking of carbon or high alloy tool steel, characters up to $\frac{5}{8}$ inch in size are recommended.

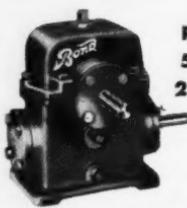
The "Tuf-Face" steel type can quickly and easily changed in the holder by applying slight pressure on a snap spring which disengages the spring from the type groove, thus enabling the type to be instantly removed. This is available in letters, figures, symbols or logotype and in sizes of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, and $\frac{3}{4}$ inch. Blank space must be used where full capacity of type slot is required in the marking application.

Bijur Oil Window Unit

Especially designed for the convenience of indicating of oil level when installed in a built-in oil reservoir casting, the Bijur Oil Window Unit shown in the accompanying illustration has been placed on the market by the Bijur Lubrication

Bond SPEED REDUCERS

Delivery
from
Stock



Ratios
5-1 to
2500-1

FOR your speed-reducing problems, specify Bond Speed Reducers. Trouble-proof service at moderate cost.

Details and list prices for the asking. Send for catalog GA-104.

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COMPANY
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THE WONDER CUTTER

A Midget
in SIZE



A GIANT
for WOMEN

Cuts wire, rods or band iron easily and quickly. Any size wire or rod up to $\frac{1}{8}$ inch round or $\frac{3}{8}$ inch square and band iron up to $\frac{1}{2}$ by 2 inches. Its small size and low price makes it possible to have more than one, mounted wherever convenient. Gauge can be set for repeated cuts or same length on both wire or band iron. FREE TRIAL in your own shop. Write for further information and prices.

The Federal Foundry Supply Co.

4606 East 71st St. Cleveland, Ohio



Model U-TR
A 60,000
R.P.M. Unit

aterials, char-
size are re-
duty mark-
of cold m-
on, char-
ze are re-
parking w-
carbon at-
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nended.
The type can
in the hole
re on a spi-
the spring
enabling it
ed. The typ-
res, symb-
STORY hinges on production
and. That's why the use of this
cutting tool is so important.
designed for real production work
the toughest jobs. A powerful,
high speed grinder, widely used
and recommended... A worthy
addition to our famous "SUPER
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grinder, streamlined, excellent bal-
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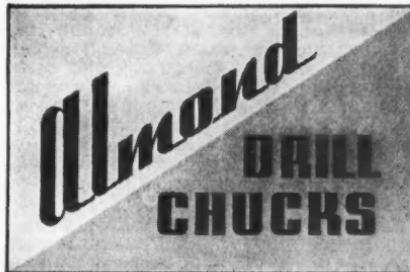
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Special reaming problems invited
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MANCHESTER CONNECTICUT



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ALMOND THREE JAW DRILL CHUCKS are furnished in 9 sizes with capacities from $3/16"$ to 1". These are made in heavy and light duty types with a taper arbor hole or with a threaded arbor hole.

WRITE FOR COMPLETE
DETAILS

T. R. ALMOND MFG. CO.
ASHBURNHAM • MASSACHUSETTS

Corp., Long Island City, N. Y. The unit consists essentially of a window of clear plastic assembled in a polished metal housing. A special oilproof synthetic gasket is used to ensure an oiltight fit between window and frame. The bright background of the housing together with the plastic window provides sharp visibility of oil level. Two holes in the metallic background give easy passage to the oil.

Using the assembly tool shown in the illustration, the Bijur Oil Window Unit may be pressed into a reamed hole in the machine casting provided the cast-

ing wall thickness is $\frac{1}{4}$ inch or more. Use of the assembly tool is said to insure correct alignment of the oil window unit with the machine face to prevent any possible scratching of the window unit. A thin coat of Glyp-



Bijur Oil Window Unit



Nameplate Detail Press

This machine quickly stamps details and serial numbers into name plates.

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Correct misalignment, prevent whip, backlash, handle pulsating loads, protect machinery. NON-LUBRICATED. There's an L-R for every duty. Write. Catalog free.

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L-R Type "WQ"
Pat. & Pats. Pend.
2.8 to 2350 h.p.

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THEIR PRECISION

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Production

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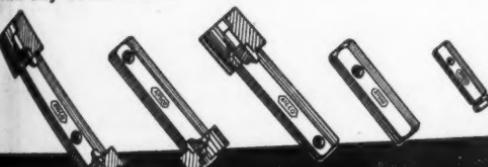
Send for descriptive pamphlet.

W. L. STEEGE MACHINERY CO.
102 JEFFERSON ST. CHICAGO, ILL.

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Quick deliveries through saving of time and labor in your toolroom are important for Victory. Don't take chances with substitute materials. Let us supply you with —

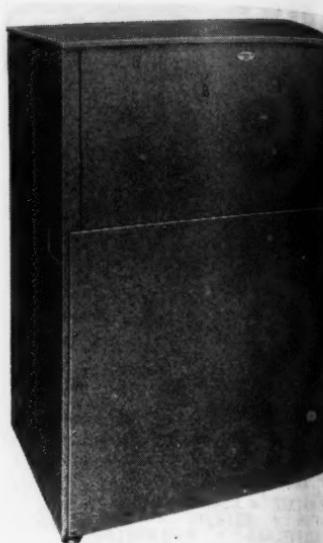
ALL METAL HANDLES for your PLUG AND THREAD GAGES
Toplock and Trilock types. American Gage Design Standard. Made accurately for interchangeability with any other make.



AURELIO TANZI ENGINEERING COMPANY
430 JEFFERSON STREET • BROOKLYN, N. Y.

Temprite Model 580-WC Spot Welder Cooler

Designated as the Temprite Model 580-WC Spot Welder Cooler, a special self-contained cooling unit designed to supply a constant flow of low-temperature water to electric spot welder tips and transformers has been placed on the market by Temprite Products Corp., 47 Piquette Ave., Detroit, Mich. The unit operates as a water circulating system and can be used with one, two, or three spot welders, depending upon the maximum heat load of the welders and



Temprite Model 580-WC Spot Welder Cooler

the resistance to flow through the water circuit.

The Model 580-WC is equipped with an instantaneous water cooler and accessories, including a patented constant temperature control valve, 1/4 h.p. refrigeration condensing unit, and 1/2 h.p. water circulating pump. The system is said to be capable of circulating 120 gallons of water per hour against a spot welder pressure drop of 100 pounds per square inch. The pump is equipped with an adjustable by-pass valve so that the rate of water flow through the spot welder assembly can be controlled.

The cabinet is constructed of heavy gauge furniture steel, properly ma-

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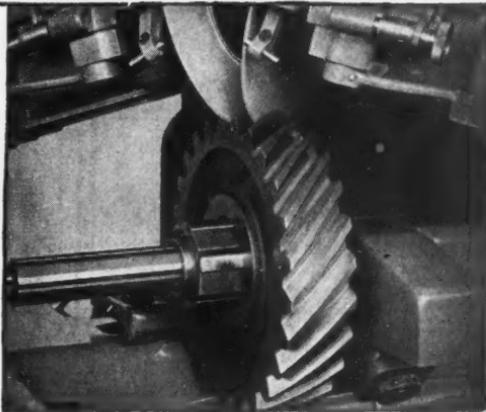
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Reduce Costs

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Or Gears cut to usual standards
without grinding

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LEAKPROOF
and
Trouble Free

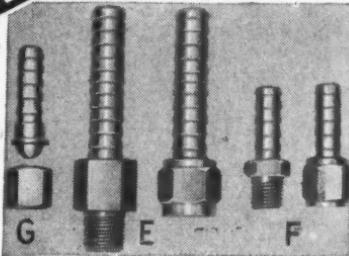
The only Air Gun with enclosed lever
that operates the valve thru a ball
and socket joint.

Patented
May 1939



Made in sizes and types
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Our Air Guns waste air and reduce pressure. AIR-O-CHEEKs save power and avoid troublesome maintenance.
Prompt deliveries on high priorities.



Fittings for air and welding hose.

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MILWAUKEE SURFACE PLATES



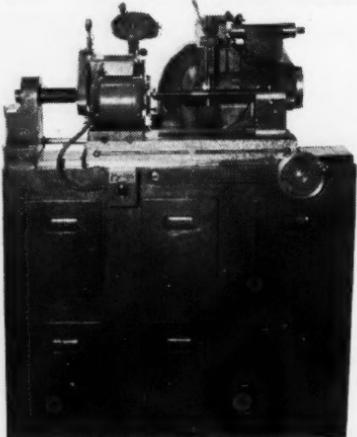
36" x 48" . . . semi-steel . . . accurately machined. Securely mounted cast legs are machined and provided with adjusting screws for perfect alignment. Shipping weight, 1300 lbs. Also larger or smaller plates with planed or scraped surface. We also manufacture angles and parallels as shown underneath surface plate.

Write for details.

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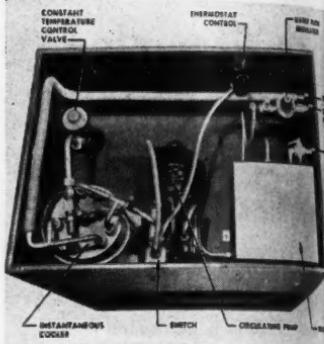
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6"x12" THREAD GRINDER Model B



THREAD GRINDING MACHINES
PORTABLE PRECISION GRINDERS
BALL BEARING SPINDLES

General Machine Tool Co. Seneca Falls
New York



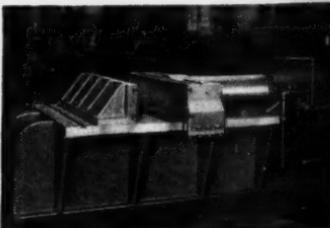
Temprite Model 580-WC Spot Welder with top removed to show internal construction.

proofed and finished in olive green Krinilac lacquer. The cabinet is 36 inches high, 34½ inches wide, and 18 inches deep. Net weight of Model 580-WC cooling unit, 500 lb.; shipping weight, 550 pounds.

Beatty 200-Ton Hydraulic Bulldozer

The illustration shows a hydraulic bulldozer especially designed for heavy metal-working operations which has been produced by the Beatty Mach. & Mfg. Co., Hammond, Ind. The machine, which has a capacity of 200 tons, is provided with a stroke of 36 inches, a pressing speed of 20 inches per minute, and return speed of 60 inches per minute. The shut height of the unit is adjustable from 14 to 24 inches, and the machine has a maximum opening of 36 inches. The ram head and resistance lug of the unit are both 12 x 60 inches in size. The table measures 60 inches right to left.

Beatty 200-Ton Hydraulic Bulldozer



GRANT

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Pioneers in the riveting field. Head rivets from smallest to $\frac{1}{8}$ " diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles.

Write for literature—and don't forget to send samples.

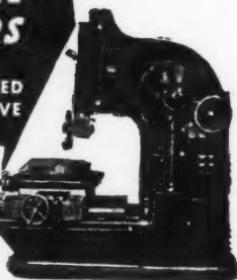
THE GRANT MFG. & MACHINE CO.
96 Silliman Ave.
Bridgeport, Conn.

Accurate, High-Speed

MOREY VERTICAL SHAPERS

SELF-CONTAINED
MOTOR DRIVE

- 8" STROKE
- 12" STROKE
- 14" STROKE



FEATURES:

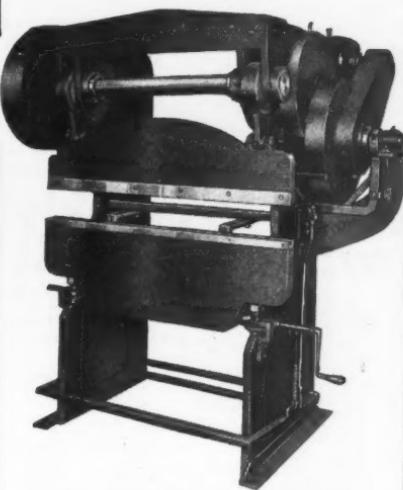
Precision . . .
Easily handled—
your operators
will appreciate it
Cutting
Stroke changed
quickly . . . Feeds
varied
Power rapid traverse in all directions . . . Brake
for ram automatically applied . . . Bilur Lubrication . . .
Timken Bearings—Bull gear mounted on Timken Bearings . . .
Modern Design—built to the highest standards of workmanship
and materials—simplified operation, powerful yet
finger-tip control . . .

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is accurate, compact, and ruggedly
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Sizes 4, 5 and 6 ft. capacities up to 10
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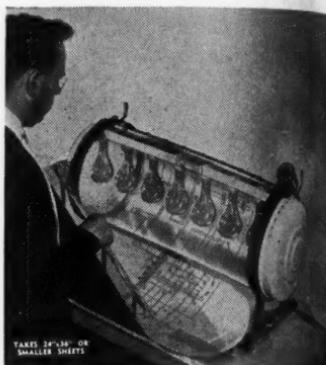
ILLINOIS

"Victoray" Machine

A machine for use in quickly making blueprints as well as black and white prints, to be known as the "Victoray," is now being marketed by the Victoray Corp., 15 Surby Ave., Battle Creek, Mich. The machine is said to produce a 24 x 34-inch print on a 24 x 36-inch sheet in less than three minutes in broad daylight. Several smaller size prints can be made in one operation.

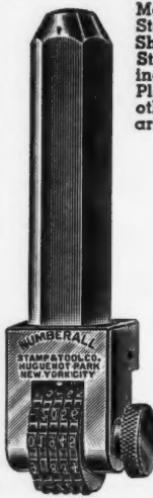
According to the manufacturer, the Victoray is silent in operation and can be handled by any inexperienced work-

man. The machine is arranged for connection to an electric circuit and can be operated on 110-120 volts, alternating or direct current. The unit is said to consume only 1,200 watts. The eight incandescent lamps of the ma-



"Victoray" Machine

Mark It Quickly with a NUMBERALL



Made with 1 to 10 wheels.
Stamp in perfect alignment.
Shank for Hand or Press
Stamping. Platform for stamping
Name No. 45
Plates and other small
articles.



N E W Quick Set Ma-
chine. One wheel can
be turned quickly by
knurled knob for con-
secutive numbering.

NUMBERALL STAMP
& TOOL CO.
Huguenot Park,
Staten Island, N. Y.

chine are said to have a minimum life of 1,200 printing hours and are readily replaceable.

The Victoray Machine is 36 inches long, 21 inches high, 15 inches wide and weighs 60 pounds.

Wells Model V-12 Metal-Cutting Band Saw

Designated as the Model V-12, a metal-cutting band saw having a capacity for 13 x 16-inch rectangular work and 10-inch diameter round work has been introduced by the Wells Mfg. Corp., 80 Tyler St., Three Rivers, Mich. Feature

KUTMORE HIGH SPEED ADJUSTABLE HOLLOW MILLS

16 standard sizes—Cutting capacities $1\frac{1}{32}$ " to 2". Also special made to order.

The KUTMORE is the only hollow mill with built-in micrometric adjustment. Prompt delivery—even on specials. Write for Catalog No. 15.

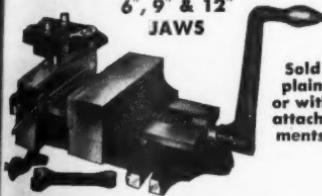
CARL WIRTH & SON, 1625 Clinton Ave., N.

Rochester, N. Y.

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volts, amperes.
The unit
watts. The
of the ma-

GRAHAM MULTI-PURPOSE VISE

6", 9" & 12"
JAWS



Sold plain
or with attach-
ments

Attachments make it a
jig or fixture that
can be used many ways

On drill press, radial, miller, planer, shaper, and grinder this vise handles repeat-operation jobs like a custom-made jig. Flush construction to precision parallels and right angles. Heavy duty construction.

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GRAHAM MFG. CO.

36 BRIDGE ST. EAST GREENWICH, R. I.

MARK IRON, STEEL and CARBIDES



THE *Echograph* Mark

Original Electric Etcher. 3000 in Daily Use

Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides—quickly—plainly. • Three sizes to meet all requirements. • Also a combined Echograph and Demagnetizer.

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40 CHURCH ST. NEW YORK

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re ready

36 inches
hes wide

Cutting

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NEST BECAUSE you can't get new ma-
pacity in machine tools is no reason why you can't
and buy new machine tool production out of
the equipment you now have—regard-
been in
Corp., 30 years of age. Simply use the modern,
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today's deeper cuts at higher speeds
and the increased output will surprise you.
It's a quick, easy change to make
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engineered for your machines and shop
conditions. Get all the facts. Write or
call today.

BERKELEY EQUIPMENT COMPANY
(Formerly located at Corry, Pa.)

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Power Drives

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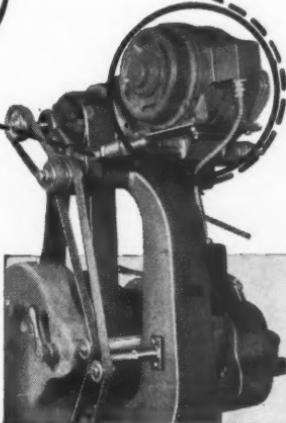
The Drive to Greater Production

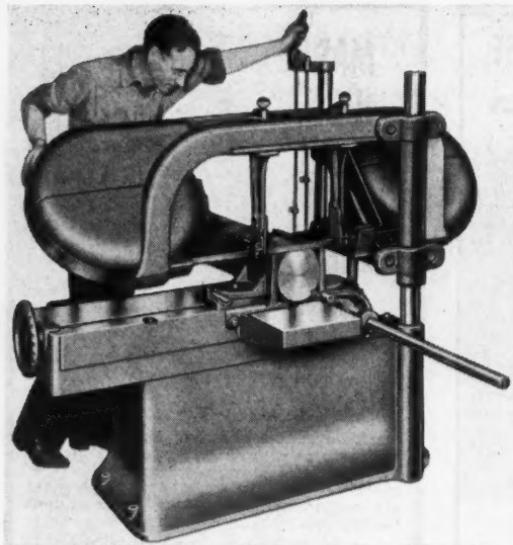
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Lathes, Shapers,
Planers, Milling
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Grinders of All
Types, Any Ma-
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New Plant and
Headquarters:
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DANVILLE, ILL.





Wells Model V-12 Metal-Cutting
Band Saw

of the machine include a hydraulically controlled feed and lift apparatus, hand-operated quick-acting vise, belt and gear drive, and ball bearing support of moving parts.

The Model V-12 band saw is ruggedly constructed and is equipped with a $\frac{3}{4}$ h.p. electric motor which can be regulated for driving the blade at speeds of 53, 94, and 148 feet per minute for cutting practically any metal in almost any shape. The machine is $5\frac{1}{2}$ inches high overall, requires a floor space of 73×30 inches, measuring 24 inches from the top of the bed to the floor, and weighs 1,750 pounds.

Jomac Fire Blanket

To meet the need for a fire-proof means for extinguishing the flame of burning workman's clothing, the C. Wall Jones Co., East Germantown, Philadelphia, Pa., has developed a specially knit fire blanket which is said to be 100 per cent flameproof, regardless of the intensity of the fire. The blanket, which is known as the Jomac Fire Blanket, is available in an attractive, flame-proof container which may be hung on the wall beside fire extinguishers, in first aid stations, or included with the equipment provided for air wardens, thus making available effective, on-the-spot protection wherever there is danger of a workman's clothes being ignited.

Osborn Soft Surface Wire Brush

An unusually soft surface rotary wire brush designed for use in removing insulation from delicate electric conductors has been developed by The Osborn Mfg. Co., Cleveland, Ohio. The brush which is in the form of a cylinder 1 $\frac{1}{2}$ inches in diameter x 2 inches long, made of 0.0025-inch thick mild steel wire which is so closely packed that approximately a quarter of a million points are provided over the surface area of the brush. The brush surface is said to be as soft as velvet although each point is as sharp as a needle.

The Osborn Soft Surface Wire Brush is designed for removing insulation from wires of various types and sizes.

GRAY TURRET HEAD METAL CUTTER OR NIBBLER



GRAY, Originator of
First Practical Metal
Cutter or Nibbler

Most modern Nibbler for
Template Cutting, Tool
Rooms, Shipbuilding, Air-
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ing, Sheet & Plate Shops.

GRAY MACHINE CO.
Box 596, Philadelphia, Pa.

The BARNES Motor Driven Precision CUTTER GRINDING MACHINE

For Precision Grinding of
Formed Milling Cutters used
in the manufacture of rifles,
pistols, etc.

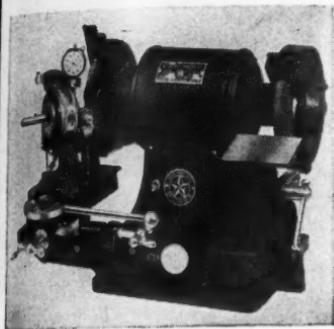
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the fire.
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PERFECT POINTS ON STANDARD DRILLS

SIZES No. 41 to $\frac{5}{8}$ "



Trim your drill costs with a STAR Precision Drill Grinder. Write for Folder.

Star Machine & Engineering Corp.

Division Star Electric Motor Co.,
BLOOMFIELD, N. J.

No. 4 Plain Tool

and Cutter Grinder



Also supplied as a
Universal Machine
with cylindrical and
internal grinding
attachments.

The No. 4 can han-
dle the greater
majority of grind-
ing operations.
It will grind cutters
on centers, $6\frac{1}{4}$ "
diameter . . . on holder, 14" diameter.

Write for complete details on this
excellent tool room investment.

Production Machine Co.

GREENFIELD

MASSACHUSETTS

Polishing Machines • Sensitive Drills

POWER SCREWDRIVERS FOR SMALL SCREWS

Automatically Feeds and Drives
No. 2 to No. 6 Screws at Rate of
ONE Second per Screw.

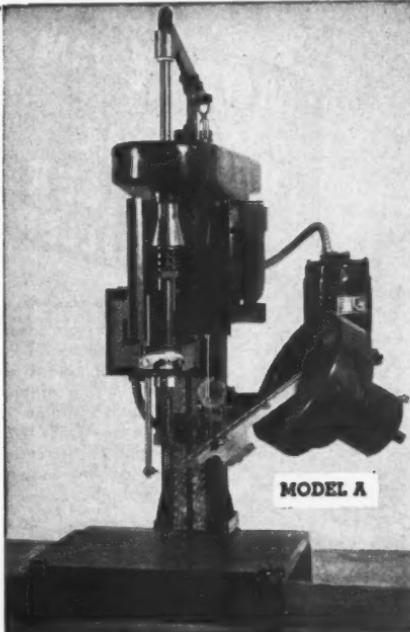
Drives All Screws to a Uniform
Tension.

No Marring of Heads.
No Stripping of Threads.

**Send Sample Jobs for
Production Estimates**

DETROIT POWER SCREWDRIVER CO.

2807 W. Fort St., Detroit, Mich.



use, two brushes of this type are mounted on separate spindles which are arranged so as to operate parallel to each other. The spindles may be individually driven or one motor used for both. The proximity of the brush surfaces is determined by the job to be done.

Insulation is removed from wire by inserting it between the rotating brushes and pulling it out. The rotary speed of the brushes varies with the type of insulation and size of wire being stripped. The gauge of the wire in the brushes is determined by the



GEARED FOR VICTORY

BEVEL — HELICAL
SPUR — WORM



THE TAYLOR MACHINE CO.

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CLEVELAND OHIO

"TAYLOR - MADE"

Preloaded Precision Bearings for Spindles

MOREY 12M
HIGH-SPEED
VERTICAL
PROFILER
and **MILLER**

Two spindle or single spindle
Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.
Ask for Bulletin 680-A

MOREY MACHINERY CO., INC.
410 Broome Street New York, N.Y.

amount of scoring permitted on the wire being cleaned. Where the electrical resistance of the conductor is carefully calculated, even a very small amount of scoring is said to be avoided.

Hammond No. 3 Abrasive Belt Backstand Idler

Designated as the No. 3, a heavy-duty abrasive belt backstand idler designed for use with Hammond "OD" cylindrical polishers and standard polishing lathes has been announced by Hammond Machinery Builders, Inc., 115 Douglas Ave., Kalamazoo, Mich. The unit is equipped with a ball bearing idler pulley having simple adjustments for belt positioning and tracking. The design of the unit also includes a spring-

READING BENCH KEYSEATER

Portable—move directly to job; a time saver for both small and large shops.

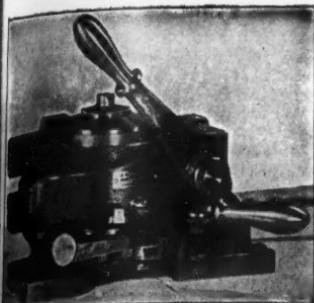
3 1/4" stroke; adaptable for other work.

Low first cost—prompt delivery.

Good dealers wanted.

READING MACHINE CO.
READING (Cincinnati) OHIO





DEARBORN Automatic Chucking and Indexing Fixture

HILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN

70 S. CLIFF ST. • ANSONIA, CONN.



Vertical Mill and Jig Borer

A simplified, precision tool for milling, boring, facing and routing small parts for instruments, arms and munitions in tool, die and machine shops.

Spindle dia. at driving end, $\frac{1}{2}$, 1150 and 1750 r.p.m., 5 speeds. 12" longitudinal travel of table, 7" cross travel. 4" spindle feed.

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A G & S Representative
in all principal cities.



Granite State Machine Co., Inc.

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Exclusive Selling Agents

H. Leach Machinery Co.

387 Charles St.

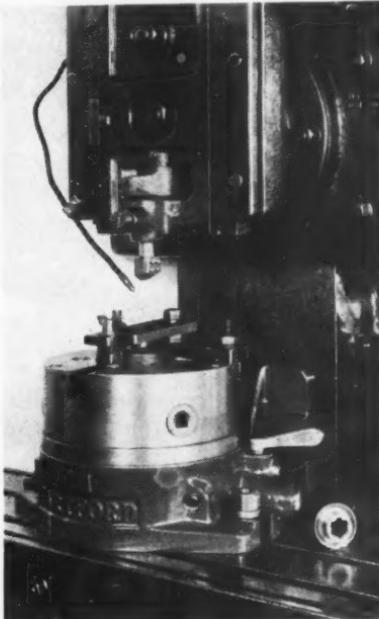
Providence, R. I.

HARTFORD "SUPERSPACER" FOR VERSATILE SPACING

Very accurate multi-splines are being slotted by Hartford "Superspacer" in heat-treated steel in this illustration. A special holding fixture is mounted on the face of the chuck.

The HARTFORD "Superspacer" is more rigid and more rapid in operation than the conventional dividing head. It can easily be set up for one piece or thousands. Interchangeable mask plates make errors impossible on divisions of 2, 3, 4, 6, 8, 12 and 24.

Write for complete specifications and illustrations of milling, drilling, grinding, jig boring, planning, slotting and boring operations.

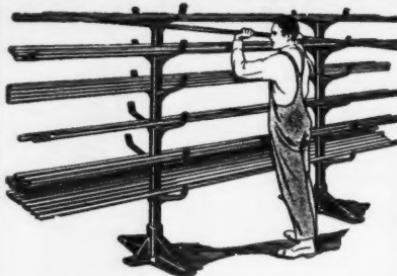


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SPECIAL MACHINERY CO.

HARTFORD

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A TIME SAVER



The BROWN SECTIONAL RACK saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

SEND FOR BULLETIN 26-M.

BROWN
ENGINEERING CO. 120 N. THIRD ST.
READING, PA.



- ◀ Special Anti-Mushrooming
- Anti-Chipping Heat-Treat
- ◀ Oversize Shanks
- ◀ Exclusive Knurled Back
- ◀ Exclusive Thumb Grip
- ◀ Broach-Rounded Corners

A Complete
Engineering Service
on Marking Devices

Write for Price and Data
Bulletin No. 113-12

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit

loaded adjusting screw and handwheel for maintaining uniform tension of belt during use and for quickly and easily releasing tension when changing belt.

Operated in connection with a Hammond OD cylindrical polishing machine the No. 3 abrasive belt backstand idle can be used to finish straight and rounded parts such as bombs, univer-



Hammond No. 3 Abrasive Belt Backstand

joints, condenser tubing, shell cases, gun barrels, steel tubing, brass magazine and so on, ranging from $\frac{1}{4}$ to 9 inches outside diameter.

"Insta-Lite" Fluorescent Lighting Fixture

A fluorescent lighting fixture which is said to provide full intensity illumination without flicker or delay the instant the switch is turned on, to be known as the "Insta-Lite," has been placed on the market by The Sprague Electric Corp., 18220 Lanken Ave., Cleveland, Ohio. With the unit, ballast

and handwheel
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with a han-
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ckstand ide-
ht and shov-
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BAUMBACH



STANDARDIZED DIE SETS

Machined
Steel

Semi-
Steel

DROP FORGED STEEL

Standardized Die Sets, embodying many exclusive features, a listing of more than 155,000 stock sizes and 46 different styles afford a service that is unsurpassed.

Send for Our New Catalog

E. A. BAUMBACH MFG. CO.

1806 S. Kilbourne Ave.

Chicago, Ill.



Save Time on WAR ORDERS with a BEVERLY Throatless SHEAR

If you're cutting straights—rounds—irregulars on "War" jobs, you can speed 'em up and eliminate distortion with a BEVERLY. Write for sizes and prices now!

BEVERLY SHEAR COMPANY

3004 W. 111th St.

Chicago, Ill.

The MOREY 2G Back-Geared TURRET LATHE

Timken Bearing

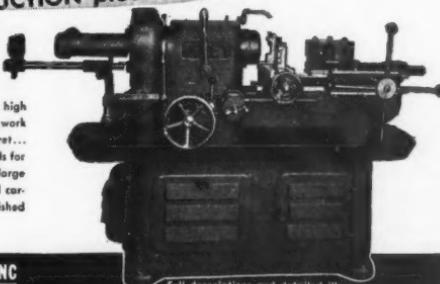
Self-Locking Turret—Infinite Spindle Speeds

Features HIGH SPEED PRODUCTION plus OPERATING ECONOMY

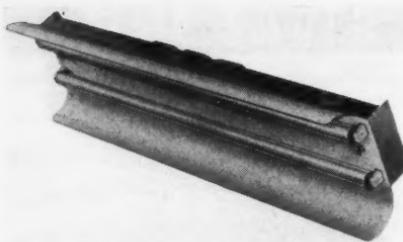
The MOREY 2G Timken Bearing Turret Lathe insures today's high speed production with a minimum of operating expense. More work at less cost with these money saving features: Self-Locking Turret... Vibrainless precision with an infinite variety of spindle speeds for every job... Back Gears instantly thrown in through extra large Twin Disc Clutch... takes full advantage of high speed and carbide tools. Modern design for modern production. Can be furnished with tooling.

MOREY MACHINERY CO., INC.

610 BROOME STREET • NEW YORK, N. Y.



Full descriptions and detailed illus-
trations are shown in Circular 629.
Ask for it TODAY!



"Insta-Lite" Fluorescent Lighting Fixture

and starting switch functions are combined, and no additional starters are required.

The Insta-Lite Fluorescent Lighting Fixture is designed so that lighting starts at unusually low voltages and temperatures. Additional features claimed for the fixture include low power loss, minimized stroboscopic effect, and stabilized lighting performance at level of maximum lumen output.

Approved by Underwriters' Laboratories, the Insta-Lite Fluorescent Lighting Fixture is equipped with two 40-watt tubes designed for operation on 110-125 volts alternating current. Avail-

able in types for industrial and commercial installation, the fixture has a nonmetallic reflector which is constructed according to Bureau of Standard specifications.

Service "High-Lift" Lever Lift Hydraulic Lift Truck

The Service "High-Lift" Lever Lift Hydraulic Lift Truck illustrated here with has been added to the line of trucks marketed by the Service Car & Truck Co., 440 Somerville Ave., Somerville, Mass. The truck, which han-



Service "High-Lift" Lever Lift Hydraulic Lift Truck in Raised Position

maximum capacity of 5,000 lb., is to be particularly useful in lifting supporting material for feeding to machines due to an unusually high lift. The unit has a lowered height of 19 inches and raised height of 19 inches.

SAFE

DAYTON SAFETY LADDERS
have every advantage

No extra man needed to steady—Roomy platform for men and tools. Great strength, lightweight. Guard rails on platform—Automatic locking. Folds compactly.

Airplane spruce is used throughout. Steel braces. Safety shoes. Sizes 3' to 16' in height—Elevating platform adds extra height to Dayton Ladders. Write today.

DAYTON SAFETY LADDER

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CINCINNATI, OHIO



CENTERLESS GRINDING

ACCURACY — PROMPT SERVICE

Commercial Centerless Grinding Co.
6603 Cedar Avenue Cleveland, Ohio

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fixture ha
which is a
part of St

Lever Lift
Truck

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service Cam
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STURTEVANT QUALITY

Permanently Accurate
Torque Wrenches



Complete Line

Permanently accurate measuring and gauging wrenches that are standard in leading war plants for setting and controlling torque in production and for testing and ensuring of inspection. Indestructible taper beam construction. Scale visible from all working angles. Capacities from 0 to 100 pounds.

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Friction
Adjustments
Moving Parts
Fragile
Mechanisms

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Bulletin

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ADISON (QUALITY) ILLINOIS

GET PEAK
RESULTS WITH
GROB
DIE MAKING
MACHINERY

"THE TOOLMAKERS
BEST FRIEND"

Compact, powerfully built, for rigorous shop service. Faster, more economical in operation.



Unmatchable performance for most difficult sawing and filing of tools and dies.

Write or wire
for details
and prices

GROB BROTHERS

GRAFTON WISCONSIN

DE AGILE EQUIPMENT



SKI POLE POINTS for example

Made on equipment regularly used in the manufacture of HASSALL special nails, rivets and screws. Thousands of similar examples. Catalog free.

JOHN HASSALL, INC.

Established 1850

394 Oakland Street

Brooklyn, N.Y.



DING
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February, 1943

and is equipped with 27-inch wide platform. Front wheels of the truck are 10 inches in diameter; rear wheels are 9 inches in diameter.

Lake Erie Shaft Straightening Press

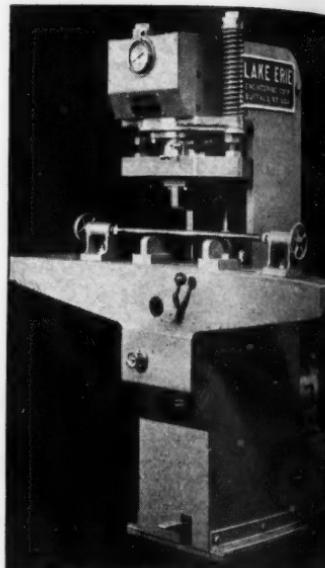
A sensitive quick-acting shaft straightening press complete with anvils and centers for testing is announced by the Lake Erie Engineering Corp., Buffalo, N. Y. The pumping unit is

HANDY RACKS



Now available in 4-Arm, 51" high or the new 5-Arm-Racks, 57" high. Used wherever flat or round bar stock or tubing is kept—factories, warehouses, schools, large and small shops. Four times the usual capacity for the floor or height space. Low cost, and money or space saved. Send for priced circular. Priority Regulations govern delivery.

Wm. S. Yohe Supply Co.
505 Gibbs Ave., N.E., Canton, O.



Lake Erie Shaft Straightening Press

WHITNEY MILLING CUTTERS

for Uniform Seating of
Whitney Woodruff-type Keys



No need for skilled labor... or for filing and fitting... when Whitney Milling Cutters are used for seating Whitney Keys. Cutters are made in all sizes to correspond with the keys which can't roll over. Complete information in Catalog V-111. Write.

The Whitney Chain & Mfg. Co.
HARTFORD, CONNECTICUT

located in the base of the press and set up so as to provide the machine with a 20-ton capacity. The ram is arranged to operate at high speed and

arranged with quick return springs. The press is constructed so that may be controlled either by a lever or foot pedal, both of which are conveniently located on the front of the machine. The downstroke of the ram can be quickly adjusted by a handwheel situated on the yoke. A handwheel controlling pressure is conveniently located on the front of the pedestal of the machine.

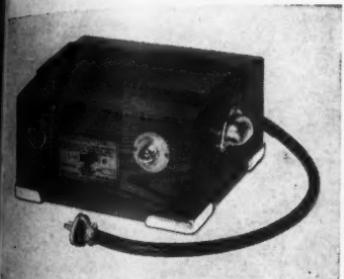
The main frame of the Lake Erie Shaft Straightening Press is constructed

New Nesting Type Tote Pan



20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

J. L. LUCAS & SON, INC.
Bridgeport, Conn.



THE J & H DEMAGNETIZER

FOR ALTERNATING CURRENT

The J & H Demagnetizer requires no countershaft, belts, or other intricate electrical connections. All that is necessary is to plug it into the nearest lamp socket or receptacle. It is of the new Unipole type—heavy duty—and can be supplied for either 110 or 220 volt alternating current. Size 12" long, 9" deep, 6" high. Weight 60 lbs.

Sold on One Week's Trial

J. & H. ELECTRIC CO.

222 Richmond Street, Providence, R. I.

SAFETY WEDGE GRIP

HOLDERS FOR SERIAL NUMBERING

- Furnished with any Size Character
- Deeper Impressions
- No Spalling
- No Mushrooming
- Positive Grip
- Safety Snap Feature for Quick Change of Type Inserts



Write for prices and literature

M. E. CUNNINGHAM CO.
MARKING DEVICES

158 E. Carson St. Pittsburgh, Pa.

Yes, these screws save
Time and Space!

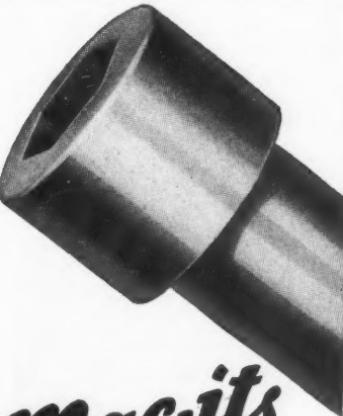


SAVE SPACE

No matter how close to a corner or flange you put Mac-it hexagon socket screws, there's plenty of room to drive them. Use this advantage to save space.

★ ★ ★

Mac-its are heat-treated to give far greater strength than plain steel screws. With that extra holding power, you may be able to use fewer screws—save drilling and tapping time.



Mac-its

PRONOUNCED
"MACK-IT"

4311

OTHER MAC-IT PRODUCTS INCLUDE: Socket head and hexagon head cap screws, stripper bolts, hollow and square head set screws, hexagon socket pipe plugs.

Strong, Carlisle & Hammond Company

• Cleveland, Ohio

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so that
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INC.

February, 1943

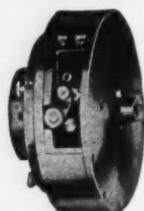
ed of rolled steel side plates electrically welded together to form one solid, rigid unit.

Nicholson Files for Naval Bronze

A line of files especially designed for use in filing naval bronze is now being marketed by the Nicholson File Co., Providence, R. I. The files are provided with very strong and sharp teeth which are said to retain their sharpness even subjected to severe use. The teeth are shaped so as not to dig into

the metal, thus enabling good finishes to be obtained and counteracting any tendency of the files to run off to one side.

Nicholson Files for naval bronze are



M-D Facing Heads

With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse, feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT-DIXON CO.

120 PHILADELPHIA ST.

HANOVER, PA.

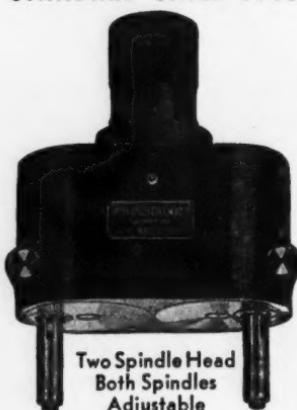


For Naval Bronze

Nicholson Files for Naval Bronze

U. S. HEADS

STANDARD SINCE 1915



Two Spindle Head
Both Spindles
Adjustable

The United States Drill Head Co.

1954 Riverside Drive
CINCINNATI, OHIO

available in the same types and sizes as the company's regular purpose files.

Cramer Multi-Contact Timers

A line of multi-contact timers designed to automatically control a sequence of "on" and "off" operations of a single or multiple number of electrical circuits in accordance with a predetermined operating program is now being marketed by The R. W. Cramer Co., Inc., Centerbrook, Connecticut.



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

STEEL READY TO GO!



Order from Bissell's large new warehouse. More kinds of steel and more of it. Everything from alloy steels to tool steel tubing. Ready to go—direct to your plant.

FREE CATALOG

BISSETT Steel
145 E. 67th St. • Cleveland, Ohio • HEnderson 0995



QUICK DELIVERY

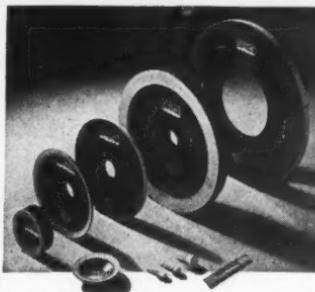
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Sheets and Prices . . .
COLONIAL BUSHINGS, Inc.
145 Jos. Campau St., Detroit

COLONIAL
DRILL JIG BUSHINGS

February, 1943

DIAMOND WHEELS
RESINOID
BONDED

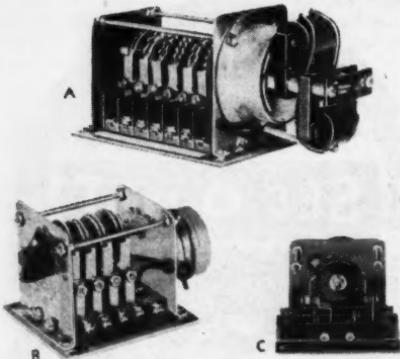
SECOMET



SECOMET Resinoid Bonded Diamond Wheels can do your work more accurately, faster, and without appreciable wear. They are most economical for sharpening cemented carbide and multi-bladed tools, such as milling cutters, broaches, etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding operation. Catalog on request.

Prompt deliveries

J.K.SMIT & SONS, Inc.
157 Chambers St.
New York
N.Y.



Cramer Multi-Contact Timers

Features of the timers include a self-starting synchronous motor, complete gear trains operating in oil, and bakelite cams mounted on shaft in identical pairs so that "off" and "on" increments can be adjusted to the desired operating program. Timers can be manually operated. Contacts are in plain view so that their operations can be

observed clearly. Timers are also available with remote momentary starters.

Cramer Multi-Contact Timers can be used to control a series of machine operations in definite order, to automatically reverse or alternate in operating a group of motors, machines, or devices and in numerous other applications where sequence operations are of prime importance.

Milburn "Ply Garb" Protective Clothing

A line of protective clothing consisting of sleeves and aprons, to be known as "Ply Garb," is announced by the Milburn Co., 3246 E. Woodbridge, Detroit, Mich. The clothing is said to be particularly useful for workers exposed to water, acid, fire, alkalis, and chemicals of all kinds.

Made of featherweight but extremely tough plastic laminated cotton cloth, Ply Garb Sleeves and Aprons offer maximum comfort and freedom of movement. The sleeves feature special vents to guard against excessive perspiration. Adjustable shoulder straps make it easy to fit the aprons to the individual.

FOR THE DURATION!

- MORE SPEED
- LOWER COSTS

FAMCO Presses step up production and assembly operations requiring percussion and pressure. 40 STOCK SIZES AND MODELS scientifically engineered for greater capacity, size for size, and trouble-free operation.

Write for details.

FAMCO MACHINE CO.
1324 18th St., Racine, Wis.

famco FOOT AND ARBOR PRESSES

Why Use A Shaper to cut Keyways when a

DAVIS KEYSEATER

will do the job so much quicker and better?

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DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

GRiffin BAND SAWS

by G. W. GRIFFIN CO., Franklin, N. H.



special steel and heat treatment enables GRIFFIN BAND SAWS to give the maximum in cutting service under various speeds and feeds. All Bands have Raker teeth and one standard camper.

They are furnished in coils or cut to length, welded and ready for use.

JOHN H. GRAHAM & CO. INC.

General Sales Agent

5 Duane Street • New York City

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CONTRIBUTE \$50,000.00
FOR U. S. FIGHTER PLANE

We are proud to announce that out of their own pockets, the employees of Universal have bought and paid for a \$50,000.00 U. S. fighter plane. And this, mind you, they have done in addition to subscribing 20% for War Bonds.

We are proud, too, of our Collet Chucks which have ground threads, ample room for tool feed-out and grip as strong as steel. Write for facts.



UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH, MICH.

**IF YOU USE TAPS
YOU NEED
WALTON
TAP
EXTRACTORS**



The price of a new tap is nothing, compared to the cost of removing the broken one by any other method. **WALTON BACKS** it out; saves the thread (and your time). Stock sizes #4 to 1½" in 2, 3 and 4-flute styles. Sent on 30 day free trial. Booklet 151 gives details and prices. Write for it today.

The Walton Co.
98 ALLYN STREET
HARTFORD • CONN.

**RED-E
CENTERS
WON'T LOSE
THEIR TEMPER**

because they have High Speed ends. They will outwear ten tool steel or carbon centers.

Write for sizes and prices.



HIGH SPEED CENTERS.

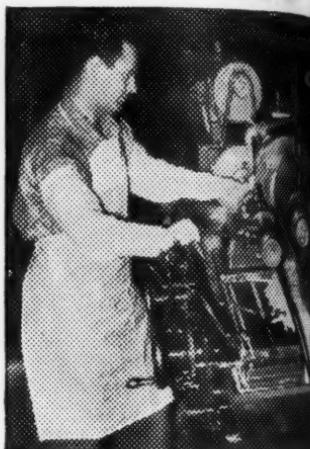
CATALOG S-43

**THE READY
TOOL CO.**

510 Iranistan
Ave.

Bridgewater
Conn.

val. The aprons are available in full-front and split-front types. In the latter type, the garment may fastened around the thighs and legs.



Workman Equipped with Milburn "Ply Gar" Protective Clothing

a manner similar to cowboy chaps.

According to the manufacturer, Garb fabric is sturdy enough to resist tears, snags on rough surfaces, cracking yet has sufficient flexibility to resist wear and afford complete comfort. Ply Gar Aprons and Sleeves made for both men and women, each detail of design and manufacture complying with the recommended specifications of the United States Department of Public Health for the most effective protective clothing.

**Steber 1610 Series "Circulite"
Floodlights**

The Steber Mfg. Co., 2451 N. Sacramento Ave., Chicago, Ill., announces in addition of two large model floodlights designated as the 1610 Series, to the "Circulite" line of portable floodlights. These units are especially designed for lighting airports, emergency fields, hangars, shipyards, shipways, loading and unloading areas, railroad yards, factory grounds, and so on. They are also designed to be useful for providing emergency lighting for night construction or repair work, and so on.

available in
all types, w
rtern may
hs and leg

"ALL-WAY" LEVEL



The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES
 $5\frac{1}{2}'' \times 12''$ $3\frac{1}{2}'' \times 6''$

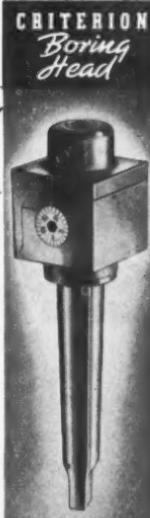
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M. B. FELL CO.
102 SOUTH ST.
ROCKFORD, ILL.

*Lead screw ground
from the solid
AFTER hardening*

SMOOTH and compact. Constant accuracy. Parts subject to wear are hardened. Large offset adjustment eliminates need for offset boring bars. Lead screw is hardened tool steel. Its threads are ground from the solid AFTER hardening.

Criterion heads are unexcelled in accuracy, in ability to withstand constant use. Two sizes $1\frac{1}{4}''$ and $3''$, $\frac{1}{4}''$ and $1''$ bar capacity. Order from your dealer or write direct. Request free literature. No obligation.



CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

For EASIER, FASTER CUTTING, Skilled Mechanics use

Super-Sterling
BROACH SAWS

That's because experience has proved the extra speed and efficiency of "the blades with generating cutting action." Specially designed teeth increase in pitch and height from starting end to the back—giving faster, freer cutting—preventing chatter and sticking. Super-Sterling Broach Saws don't scratch, they cut. Yes, and they stay in the frame longer. Ask your mill supply distributor about the complete line of Super-Sterling Metal Cutting Saws — or write Dept. B for details.

DIAMOND SAW WORKS, Inc.
BUFFALO, NEW YORK

The floodlights are available with stands designed for mounting on trucks, and other vehicles, as well as with stands equipped with casters.



INCREASE TOOL LIFE WITH PROPERLY PREPARED COOLANTS

You can save time, increase tool life and improve tooled surface finishes by preparing your soluble coolants and cutting compounds with a "LIGHTNIN" Mixer.

Whether you "make-up" for individual machines or have a central circulating or cooling system, a "LIGHTNIN" of the proper size and capacity is available to solve this problem for you. "LIGHTNIN" MIXERS CAN BE READILY CLAMPED ONTO ANY TANK OR VESSEL. They have been successfully used in large plants for mixing cutting oils for over twenty years!

Write for a catalog of "LIGHTNIN" Mixers. State the size of tank or tanks you use and the current available. Complete details will gladly be furnished.

MIXING EQUIPMENT CO., INC.

1048 GARSON AVE., ROCHESTER, N.Y.



Sieber 1610 Series "Circulite" Floodlight

units are provided with 12-inch chrome plated reflectors and are designed for use with 300 to 500 watt lamps. The floodlights are adjustable to any angle and come complete with 20-foot cords.

Aljo Hand Cut Rotary Files

The Aljo Mfg. Co., Inc., Southport, Conn., is now marketing a complete line



Aljo Hand Cut Rotary Files

of hand cut rotary files for use in filing contours, recesses, corners, grooves,

available
ting on
s, as well
casters.



"It twists and it bends, While I pull and I shake,
And give it the works, But still it won't break."

Write for Free Bulletin No. H-201.

ECLIPSE AVIATION

Seamless Flexible Metal Hose

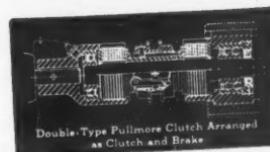
Manufactured and Sold By

Division of Bendix Aviation Corporation
DEPT. NO. 2 PHILADELPHIA, PA.

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on ERICKSON
Precision
COLLET
CHUCKS



ERICKSON STEEL CO.
2309 HAMILTON AVE. CLEVELAND, OHIO



Double-Type Pullmore Clutch Arranged
as Clutch and Brake

SEND FOR THIS HANDY CLUTCH BULLETIN

Shows HOW the construction advantages of PULLMORE Multiple Disc CLUTCHES have been utilized to solve clutch problems on machine tools, hoists, truck lifts, spring coilers, etc. Gives capacities and dimensions. Contains application diagrams.

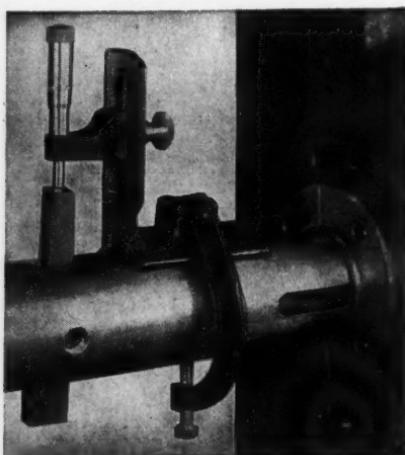
Rockford Drilling Machine Division Borg-Warner
100 Catherine Street, Rockford, Illinois, U. S. A. Corporation

THE ROCKFORD INDUSTRIAL CLUTCHES FOR SUPERIOR PERFORMANCE AND ECONOMY



Pullmore Multiple-Disc Clutches • Over-Center and Spring-Loaded Clutches • Power Take-Offs

BARTLET TOOL SETTING GAGE



**FOR FASTER BORING
TOOL SETTING — even
by Green Hands**

With this gage, you don't have to take trial cuts, mike them, and jog the cutter. Take a rough cut if you like, reset the tool to exact finishing size with this gage, and go ahead. Or, set the tool right to size to begin with, and do the job in one cut.

Designed by a Practical Man

An old boring hand thought this one up. It saves him a world of time—and it will do the same for the new fellows. Teach a new man how to use this gage, and watch him turn out the work! The gage can be used for a lot of other things, too.

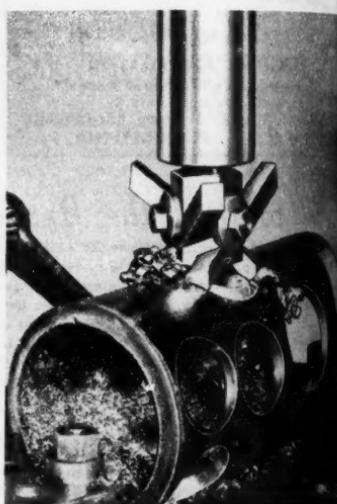
Write for our new circular.

BARTLET ENGINEERING CO.
1214 PARTRIDGE AVE. BELoit, WIS.

lets, and so on. The files can be obtained in either high carbon or speed steel and are available with various cuts of teeth; namely, smooth medium, coarse, extra coarse, dead cut, and herringbone cut. Files are finished with $\frac{1}{4}$ -inch diameter stems unless otherwise specified. Special sets of Aljo Hand Cut Rotary Files available on order.

Clark Three-Blade Adjustable Hole Cutter

A three-blade adjustable hole cutter designed for use in electric and pneumatic hand drills, portable air routers, milling machines, drill presses, lathes,



Clark Three-Blade Adjustable Hole Cutter
in Operation

and other machines accommodating Morse taper or straight shank tools. It has been introduced by the Robert H. Clark Co., 3424 Sunset Blvd., Los Angeles, Cal. The tool is available in six standard models for cutting $\frac{1}{4}$ to $4\frac{1}{2}$ -inch holes in metal, plastic, hard fiber, press board, and so on, up to $\frac{3}{4}$ inch thick. Holes cut with the tool are said to require no finish grinding or filing.

The Clark Three-Blade Adjustable Hole Cutter has a heat-treated shank

es can be
carbon or
able with
, smooth,
coarse, dou-
Files are
Special
ry Files

djustable

the hole com-
nic and per-
air mot-
esses, lathe

GEARS
Spur, Bevel, Worm, Helical, Internal, small and
large. No stocks. Send your B/P or specifications
or quotation.

SPEED REDUCERS: Over 75 types, spur, worm,
and combination. Send for Catalog. Write.



Today's problem in Production
machines and motors almost impossible to replace
GEARS must prolong their life—maintain laboratory
tolerances at extreme speeds. That means superior
materials, and precision cutting of

ABART GEARS

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and combination. Send for Catalog. Write.

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MANUFACTURERS OF
Speed Reducers & Gears
4819 WEST 16th ST. CHICAGO ILLINOIS

When you need INFORMATION on MACHINE TOOLS LOOK IN SWEET'S

There you will find
the catalogs of 110
machine tool builders
and manufacturers of
attachments, accessories
and allied equipment — just the
information you need
to help you compare
and select.

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are instantly accessible
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119 West 40th Street, New York

PROSSER CARBIDE GRINDERS

MODEL AA

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- Quick-acting indexing tables.
 - Adequate wet grinding equipment.
 - High grade ball bearing spindles.
 - Over-size wheels give longer wheel life.
 - Moderate price.
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Write for details.

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NEW YORK

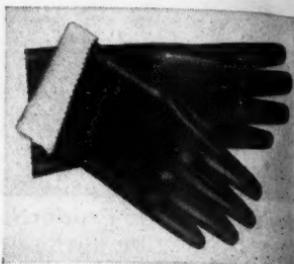


and is equipped with high speed precision ground tool bits. The hardened and ground pilot of the tool is removable to permit the use of a lead drill where desired.

Edmont Industrial Gloves for Women

Edmont Mfg. Co., 589 Orange St., Coshocton, Ohio, is now marketing a line of gauntlet type gloves for women workers which are said to provide com-

plete hand protection against solvent acids, chemicals, caustics, and other corrosive materials. Available in medium and large sizes, the gloves are



Edmont Industrial Gloves for Women

WADE ENVELOPES
protect
Shop Orders, Drawings,
Blueprints, Etc.

Made in three styles, transparent, fibre, and metal backs. Non-inflammable acetate windows. Special style or size to order. Write for details.

WADE INSTRUMENT COMPANY
Phone: CEDAR 4728
1422 E. 109th St., Dept. M., Cleveland, Ohio

PRECISION GEARS 5/16" to 16"

PRODUCED
ONLY TO YOUR
SPECIFICATIONS

SUPPLIED
IN ANY DESIRED
MATERIAL

DETROIT BEVEL GEAR COMPANY
8130 JOS. CAMPAGNE AVE.
DETROIT, MICH.

Makers of Quality Gears for 30 Years

made of fabric which is coated with synthetic rubber, thus providing gloves which are practically snag-proof and unusually wear-resistant. According to the manufacturer, the gloves are comfortable on the hands, easy to put on and take off, and particularly flexible in use.

GS No. 1120 Tool Chest

The George Scherr Co., 130 Lafayette St., New York, N. Y., announces the addition of a large capacity chest, designated as the No. 1120, to its line of precision tool chests for toolmakers, machine shops and craftsmen. The chest measures 48 x 9 1/4 x 16 1/4 inches and has seven short, Pittsburg drawers, plus an end with a right drill drawer which may be used to hold either a drill block or machinist's handbook. All drawers are fully lined.

The GS No. 1120 Tool Chest is constructed with a heavy steel frame, designed to minimize warping and cracking.

TURRET TOOL POST

Hardened throughout, self-compensating for wear, precision built. For top production on small South Bend, Sheldon, Clausing, Atlas, Logan and similar bench lathes and small screw machines.



F & M SALES COMPANY, HOLLYWOOD, CALIF.
Manufacturers and Selling Agents



GS No. 1120 Tool Chest

coated with
ding glow
-proof acc
ording
s are com
to put selected of thoroughly seasoned, solid
arly flexible wood having a fine lacquer finish.
is equipped with extra heavy hard
are, a comfortable leather handle, and
locks for added safety.

Chest

Lafay
ounces
chest, de
line of
machining
known as Gulf Super-Quench, has been
measured developed by the Gulf Oil Corp., Gulf
Refining Co., Pittsburgh, Pennsylvania.
With a cooling speed more nearly approach
ing quenching that of water through the
entire temperature range, Gulf Super-
Quench Oil is not only said to improve
the physical properties of most of the
steels it is used with but also to
minimize tendency toward distortion
and cracking. According to the manu
facturer, tests on a piece of high-carbon
steel $\frac{1}{2}$ inch in diameter and containing
0.8 per cent carbon show that Gulf
Super-Quench Oil produces a hardness
in excess of Rockwell-C 58 throughout
the entire cross-section of the piece.

StaSafe Hairgard
known as the Sta-Safe Hairgard, a cap
for women workers which is designed to
prevent the hair from becoming tan
gued.

January, 1943

SAVED DOLLARS THEN... SAVES PRODUCTION SCHEDULES NOW



The first molybdenum alloy hack saw
blade, pioneered ten years ago by
VICTOR, gave you a 50% saving in
heavy duty metal sawing costs. Today,
with tungsten scarce, VICTOR "Moly"®
High Speed—still ahead in steel anal
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maintaining production schedules
for plants who have been using other
types of high speed blades.

When you buy hand or power blades, be
sure you specify and get VICTOR
"Moly"® High Speed, the blade
with the all-over gold metallic fin
ish. Saws faster and lasts longer
wherever it is used.

FREE INSTRUCTION BOOKLET

To help you train inexperienced workers,
get "Metal Cutting", fact-packed 20-page
VICTOR booklet of helpful hints on se
lection, use and conservation of blades
and frames. It's free.



VICTOR SAW WORKS, INC.
MIDDLETOWN, N. Y.



*T.M. Reg.—Blades bearing the name "Moly" are made only
by Victor Saw Works, Inc. and affiliated companies.

© 3381

gled in machinery and to protect it from dirt, grease, dust, fire, smoke, fumes, oil mists or sprays, and so on,



StaSafe Hairgard

is announced by the Standard Safety Equipment Co., 232 W. Ontario St., Chicago, Ill. The cap is made of pre-

shrunk ivory drill with green piping is available in five different styles.

According to the manufacturer, StaSafe Hairgard is of sufficient size to contain all the hair and is adjustable as to fit the head perfectly. A nonflammable acetate visor acts as a warning bumper if wearer leans too far forward, and is of transparent construction so as to permit upward vision. The semi-rigid top of the cap provides means of warning wearer of inadequate head clearance.

Ingersoll-Rand Coolant and Circulating Pumps

A number of coolant and circulation pumps are said to be particularly suitable for installation on lathes, die automatic screw machines, cut-off machines, grinders, and other machine tools requiring a constant supply of cooling fluid or cutting oil has been announced by the Ingersoll-Rand, 11 Broadway, New York, N. Y. The pumps are also said to be suitable for use with evaporative condenser conditioning units, washers, and m-



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OVER 5000
DIFFERENT FILES?
by Grobet

THE "ORIGINAL" SWISS FILE MAKER

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss files. Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

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Ask also for catalog KM on Files for Filing Machines;
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GROBET FILE CO. OF AMERICA
421 CANAL ST. NEW YORK CITY

green piping
ent styles,
nufacture
sufficient
d is adjust
perfectly.
visor acts
r leans to
arent const
ard vision
ap provide
of inadeq



Cut
Faster

Longer
Life

◆ 92 CUTTING BITS

Answer the call for war production speed. Not only do they cut faster but save hours of time in set-up and grinding for they cut 5 to 10 times longer than ordinary tools, no matter what metal is being worked. Easily reground.

Yes, #92 Bits cost more to buy—but they cost far LESS to use and do much better work.

#92 CUTTING BITS— $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ".
Rt., Lft., Ctr. \$4.00 Ea.
Set of any three above \$10.80

Write for prices on larger or special sizes.
Every #92 Bit Guaranteed to do a better job or your money refunded.

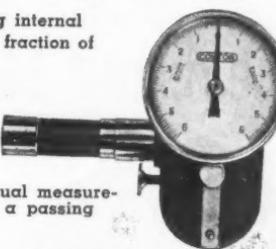
DIAMOND TOOL PRODUCTS
3310 Cottage Grove Chicago

Enables the relatively unskilled to perform precision gaging ...

COMTORPLUG

Expanding internal gaging to fraction of .0001"

Sizes:
 $\frac{1}{4}$ " to 7"
dia. and larger



Shows actual measurement—not a passing reading.

To fractions of .0001", Comtorplug checks bores for size, out-of-round, front or back taper, barrel shape, bell mouth; etc. Relatively unskilled gagers get assured accuracy through automatic features of self-alignment and self-centering giving positive 2-point gaging. Widely used in ordnance, airplane, automotive, electrical industries.

REQUEST BULLETIN 27

THE COMTOR CO.

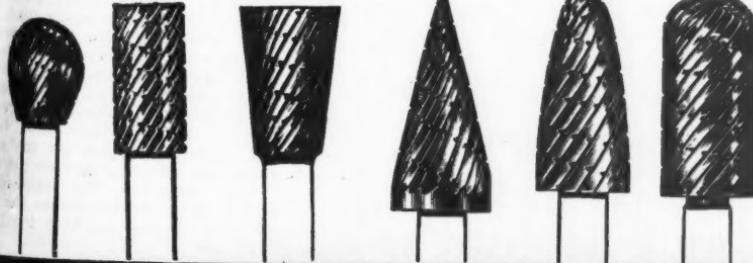
64 Rumford Ave. Waltham, Mass.

Grobet

Rotary Files GROUND FROM THE SOLID

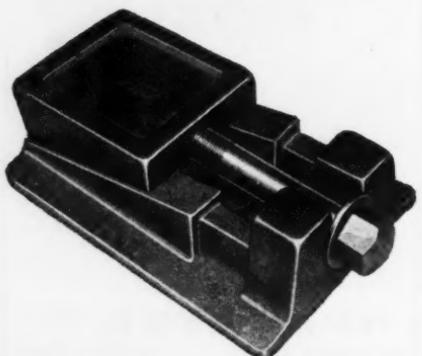
Ask for Catalog KG, the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also counter sinks and diesinkers' burs.

Also ask for Catalog K.F.; illustrating 5000 shapes and sizes Grobet Swiss Files.

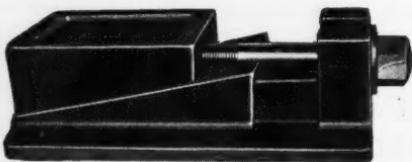


GROBET FILE CO. of AMERICA • 421 CANAL ST.
NEW YORK CITY

Accuracy Begins at the Base with Leveling Jacks



Scientifically designed leveling jacks for any equipment which demands extreme accuracy.



Standard Size No. 100A (base 6" x 9", average height 2 1/4", top section 4" x 4 1/4") will fit most requirements.

Extra large base and screw assures permanent accuracy. Angular faces are finished.

SPECIAL SIZES SUPPLIED ON REQUEST.

IMMEDIATE DELIVERY

JURZEK
MACHINE & ENGINEERING CO.
2303 HILTON RD. FERNDALE, MICH.

The pumps include $\frac{3}{4}$ and 1-inch wall mounted types, a $1\frac{1}{4}$ -inch side mounted type for low submergence applications, and a $1\frac{1}{4}$ -inch horizontal type. They are additions to the



Ingersoll-Rand Side Wall Mounted Type
Coolant and Circulating Pump

pany's regular line of coolant pumps which also includes $\frac{3}{4}$, 1, and $1\frac{1}{2}$ -inch immersion-type pumps and $1\frac{1}{4}$ -inch wall mounted type pumps.

"Lumarith" Plastic Shield for Machine Tools

A transparent plastic shield which can be applied to automatic screw machines and turret lathes for use in connection with oil is announced by Celanese Celluloid Corp., 180 Madison Ave., New York, N. Y. The shield, which is known as the "Lumarith," is designed to prevent oil which is sprayed on metal parts processed from splashing on the operator's face and clothing and on the floor around the machine. Oil splashed on the shield is directed back into the oil or splash pan of the machine for filtering and re-use.

The Lumarith Shield is crystal-clear and is said to be easy to keep clean,asmuch as oil sprayed on the shield

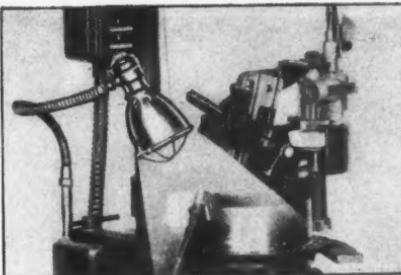
and 1-inch
inch side
emergence
inch horizontal
to the
ARTUS ARBOR SPACERS

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**

Simply insert in holes,
invert, strike sharply and
you have centers and drill
circles perfectly located.
Reduce time and eliminate
spoilage of other methods.
7 sizes U.S.S. Inexpensive
—Last for years. Write
for Circular.

**NIELSEN TOOL &
DIE COMPANY**

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ARTUS ARBOR SPACERS

The COLOR tells
the THICKNESS



ARTUS Arbor Spacers made
of plastic in various colors
identify thickness at a
glance .001, .0015, .002,
.003, .005, .0075, .010-.030.
Speed up accurate fitting at
low cost. Write for folder.
Spacers, Gaskets, Shims
IMMEDIATE DELIVERY

INDUSTRIAL PRODUCTS SUPPLIERS
6 Broadway

New York, N. Y.

**AUGMENT FLUORESCENT
LIGHTING OVERHEAD
With Vimcolight Directly
On the Work!**

Enjoy still better lighting conditions...
encourage safer, surer production. Help
employees reduce eye strain by installing
even-glowing, non-glare Vimcolights.
Used on hundreds of America's best-
known machine tools.

VIMCOLIGHT

VIMCO MANUFACTURING CO.
III CHENANGO ST. BUFFALO, N. Y.

Today's Specifications read

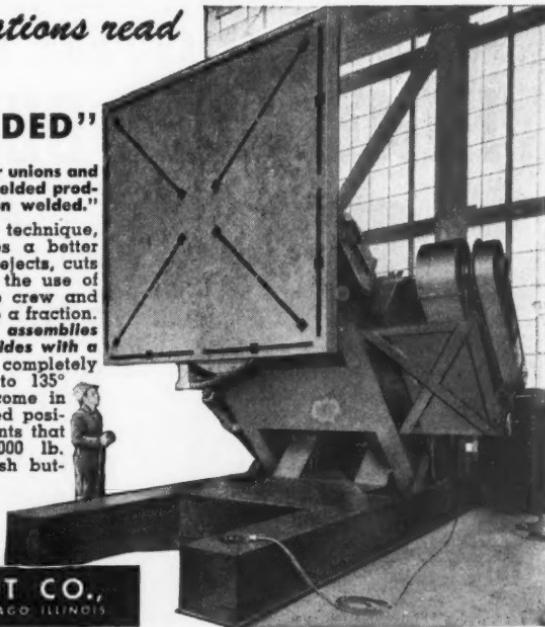
**'MUST BE
POSITION WELDED'**

To guarantee flawless welds, stronger unions and
smoother, cleaner fillets, buyers of welded prod-
ucts today specify, "must be position welded."

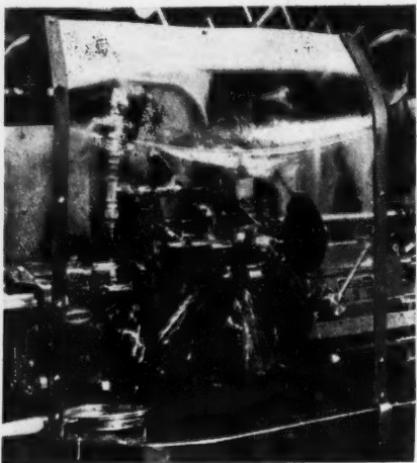
The greatest advance in welding technique,
position welding, not only assures a better
product but reduces spoilage and rejects, cuts
actual welding time by permitting the use of
welders rods, and cuts crane, crane crew and
welders handling and set-up time to a fraction.
In a C-F Positioner weldments and assemblies
can be welded down-hand on ALL sides with a
single set-up; can be revolved completely
around and tilted to any point to 135°
from horizontal. C-F Positioners come in
capacities from small hand operated posi-
tioners to large variable speed giants that
twist and turn 30,000 lb. weldments under push but-
ton control.



Write for
Bulletin WP 22.



CULLEN-FRIESTEDT CO.,
311 FAIRBURN AVE. CHICAGO ILLINOIS



"Lumarith" Plastic Shield Applied to Automatic Screw Machine

tends to remove dust and dirt from the surface. Additional features of the shield include lightweight, flexible design and ease of application.

FILMS

University of Iowa Industrial Engineering Film Library of Motion and Time Study Films

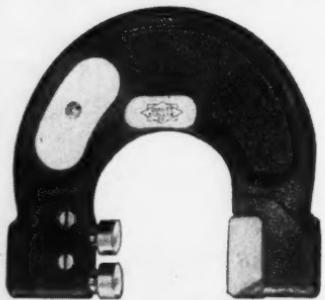
The State University of Iowa, Iowa City, Iowa, announces that its Industrial Engineering Film Library of motion and time study films has been enlarged. These films are recommended for use in war training courses and are distributed on a rental basis.

Two new sound motion and time study films—Motion Study Principles and Motion Study Applications—are available. Under silent motion and time study pictures are some 40 different films. A bulletin designated as the No. 542 listing these films and giving loan price, lengths, and so on, can be obtained upon request to the Bureau of Visual Instruction, Extension Division, State University of Iowa, Iowa City, Iowa.

Tool Salvage Film

"Save Those Tools" is the title of a one-reel, black and white, sound motion picture now being distributed by the

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International Harvester Co., 180 N. Michigan Ave., Chicago, Ill. The picture shows how this particular company's own tool salvage program was organized and its functioning methods, from salvage at individual plants to the central clearing house for the utilization of excess and obsolete tools. Emphasis is given to a low-temperature brazing process of repairing broken or damaged tools of various kinds, including reamers, drills, slitting saws, broaches, hobs, and milling cutters. Resizing of tools to smaller sizes or regrinding to different types is also treated.

The film has been highly approved by W.P.B. officials and many organizations concerned with the shortages of tools. Prints are available in 16 and 35-mm. sizes without charge other than transportation.

"The Inside of Atomic Hydrogen Welding" Motion Picture Film

Joe McGee, the Welder, the saucy cartoon personality who was introduced last summer in General Electric's industrial training films "The Inside of Arc Welding" plays a return engagement in a new series of training motion pictures on welding, "The Inside of Atomic Hydrogen Welding." Produced by the Raphael G. Wolff Studios in Hollywood under the sponsorship of the General Electric Co., Schenectady, N. Y., these films are expected to be available for manufacturing plants, schools, and other training centers about March 15th.

The training program incorporated in the new series of pictures is similar in idea and treatment to that of the preceding series. The pictures are produced on 16 mm. Kodachrome film and employ photographic, animated diagram and cartoon techniques.

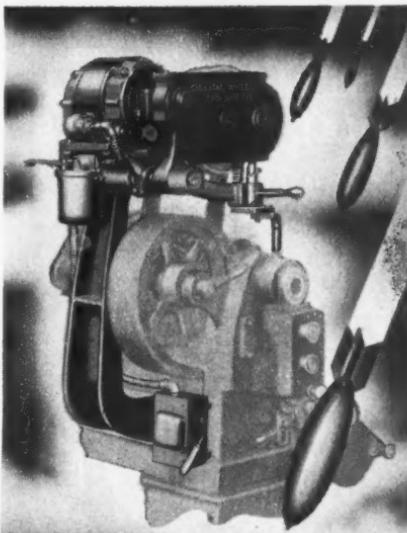
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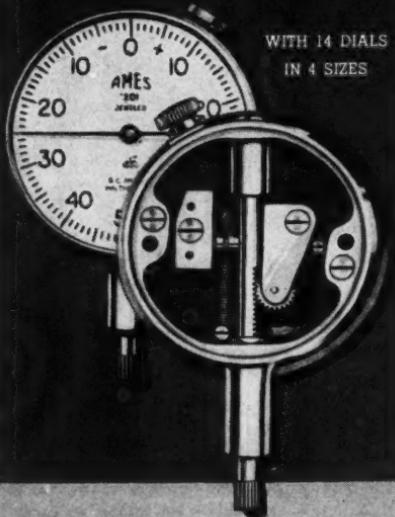
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NEW BOOKS

Training Employees As Job Instructors

To provide the executive with a guide for outlining a specific plan and program for training job instructors in his own company, the Metropolitan Life Insurance Company has issued the report "Training Employees as Job Instructors."

This handbook of training principles and practices, based on a survey conducted by the Metropolitan's Policyholders Service Bureau, discusses such important questions as the selection of job instructors, the time and place for their training, the consequences of inadequate training, the cost of training and many others that concern executives. Included in the report are samples of training programs now in operation in war production industries and many exhibits illustrating the material used in such programs.

The report is based on interviews and correspondence with Federal and State Agencies, consultations with private companies, and actual use of the training method by the author in the plant of several companies. An appendix to the report lists references dealing with the job instructor training activities of some 21 war production companies with thumbnail sketches of the training problems encountered. An executive interested in the subject dealt with by "Training Employees as Job Instructors" may obtain a copy direct from Policyholders Service Bureau, Metropolitan Life Insurance Company, One Madison Avenue, New York City.

Production, Safety, Morale—and Color

Though interest in color during wartime seems to center around the art of camouflage, its application to the home front of industry is also important. According to the Color Research Laboratory of the Eagle Printing Ink Company, Division of General Printing Ink Corporation, New York, N. Y., color in factories and offices is accomplishing much to speed up work and to help thwart a rather tragic increase in accidents brought about by the demand for speed and by the influx of new and relatively inexperienced labor.

To obtain the most utility from color here are some of the functions being applied:

Red as a danger signal is giving way to a more prevalent use of yellow, yellow-green and orange—all of which have

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much higher visibility and noticeability.
Machines are being painted in lighter
tones, both to reduce shadows and re-
flect more light and to build up better
contrast with materials handled.

Brighter color on floors increase il-
lumination efficiency and throw light on
the underside of equipment.

Colorful walls offer relief from mon-
otony and a chance to relax eyes
which are tired by critical seeing tasks.
Whole plants are being studied, hav-
ing in view color in its relation to traf-
fic, materials and operations. This is
color "engineering" in the true sense
of the word. The Eagle Printing Ink
Company will be glad to send special
prints on the subject to those inter-
ested.

Electronics — A New Science For a New World

"Electronics — A New Science for a
New World" is the name of a colorful,
illustrated booklet issued by General Elec-
tric presenting the general story of elec-
tronics—its past, its present, and its
great possibilities for the future.

"Electronics," states the booklet, "is
the science of the electron—a tiny, in-
visible particle of pure electricity, the
basis of all familiar matter. A rose-
bush, the planet Jupiter, a child's blue-
bell dress—everything in the universe—is
composed of an incomprehensibly vast
number of electrons, whirling around
their nuclei."

"Only within the last two generations
has science discovered how to control
electrons by the vacuum tube, and put
them to work for the good of mankind.

Today, through electronics, tiny marks
on a strip of film become the voice of
the Hollywood actor on the screen. A
song in New York travels across Iowa,
Utah, and Nevada's Great Basin to
California, through electronics, in less
than the fiftieth part of a second. As-
tronomers, calculating by electronics,
can measure iron in the dust of inter-
stellar space; and the 1,000,000-volt X-
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s malignant cells with radiation equiva-
lent to \$95,000 worth of radium.

"Yet this is only the edge of the
vast, endless electronic land. Each applica-
tion invites another application. Today
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reveals new worlds of wonder and sur-
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brought man to the edge of Nature's
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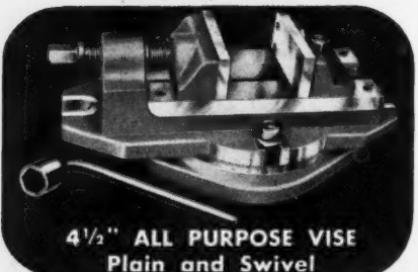
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size without measuring. Furnished in

- RED—YELLOW—GREEN—BLACK.

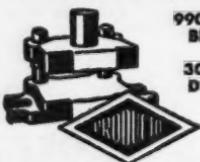
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A copy of the new booklet may be obtained by writing the General Electric Company, Schenectady, N. Y., or asking for booklet GED-1024.

Chemical Technical Dictionary. The Chemical Publishing Co., Inc., 234 Madison St., Brooklyn, N. Y., now has available an 872-page technical dictionary especially designed for use by persons wishing to read or study German, English, French, and Russian chemical literature. It is also highly recommended to translators of these languages and to college students.

Compiled by A. W. Mayer with translation under the direction of Professor B. N. Menshutkin and M. A. Bloch, the dictionary is provided with sturdy hard covers and is cloth bound. Price \$8.00 per copy.

Problems in Blueprint Reading. Revised edition. By Draw W. Castle. Edited by R. W. Selvidge. Published by The Manual Arts Press, Peoria, Ill., 112 pages. Paper cover. Price, 96 cents.

This book is designed to provide fast and practical method for instructing apprentices, machine workers, and others in blueprint reading without necessitating instruction in mechanical drawing. Written in a clear, easy-to-understand manner, the book includes data on the fundamentals of the language of drafting — what the symbols mean, how they are put together, and so on—followed by a series of working drawings or problems taken from industry.

In presenting the problems, the author has developed a unique plan which makes it possible to check instantly and accurately the ability of the student to read each drawing and enables the teacher to determine the exact char-

acter of the student's difficulty. The plan is, in a large measure, self-checking and enables the student in most cases to determine whether his own work is correct or not.

and Tappers; Screw-Cutting in the Lathe; Thread Milling; Thread Grinding; Thread Rolling; Bolt and Screw Manufacture; Measuring Screw Threads; Measurement by Optical Projection; Extracting Broken Taps; Aero Threads. Tables and an index are included at the rear of the book.

Screw Thread Manual. By F. J. Cannm. Published by the Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. 192 pages. Cloth binding, board covers. Price, \$2.75.

Especially designed for use by individuals actually engaged in screw thread production as well as by designers, draftsmen, foremen, and executives, this book sets forth the screw-thread standards in common use, giving tables of their proportions in the various sizes. The book also deals with all methods of cutting screws and modern methods of measuring them. In addition, a chapter is included on modern methods of nut and bolt production. The book, which is illustrated throughout with line drawings, is divided up into 15 chapters which are headed as follows: Screw-Thread Terms; Screw-Thread Forms; Use of Taps and Dies; Machine Taps and Dies; The Use of Die-Heads and Chasers; Die-Heads

Aerial Navigation. By W. E. Dyer. Published by the American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. 64 pages. 41 illustrations. Paper binding. Price, 75 cents.

Of an unusually practical nature, the text of this book is presented in such a manner that a previous knowledge of aerial navigation is said to be unnecessary in order to understand clearly all matter treated. Written by a man with years of actual "on-the-job" experience, the book is attractively illustrated throughout with drawings, photographs, and tables and includes questions with answers at the rear to further increase the value of the material for individual and school use. A pocket attached to the inside back cover contains a handy "Air Navigation Slide Rule," which is supplied as a part of the book.

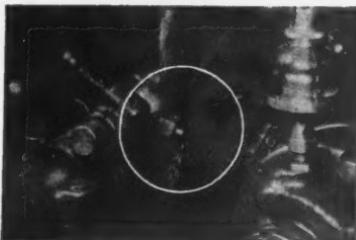
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Detroit, Michigan

Blueprint Reading. By Arthur A. Dick. Published by The Ronald Press Co., 15 E. 26th St., New York, N. Y. 157 pages, 6½ x 10 inches. Cloth binding, board covers. Price, \$2.40.

Planned for high schools, vocational schools, adult evening schools, and teacher training institutions, this book is the result of a long-felt need for a means whereby students can be taught to read general blueprint fundamentals in a relatively short period of time. The book is written by a man who has taught drafting in high school, blueprint reading to adults in evening school, and has worked as a draftsman in industry. The instructional material has been tried out under practical circumstances and the problems have been selected from classroom practice or formulated from industrial practice.

The plan of the book is workable, since each problem has a definite reason for being included in the total series. Also, each problem has an objective assignment for the student, while the instructor is provided with numerous suggestions for teaching materials and outlines. An answer book is available to facilitate the instructor's task of checking the student's work sheets. Ample problems are provided for student experience in free-hand sketching.

Industrial Inspection and Assembly. By Edward N. Whittington. Published by the McGraw-Hill Book Co., Inc., 33 W. 42nd St., New York, N. Y. 202 pages. Semi-flexible covers, cloth binding. Price, \$1.75.

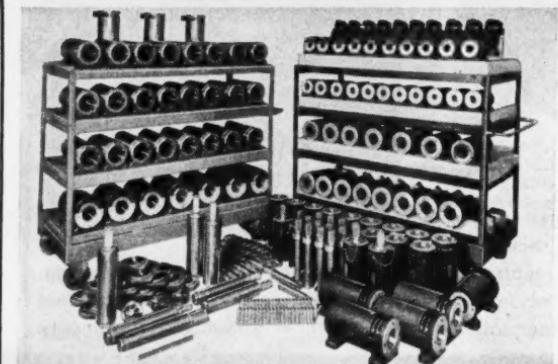
Written for both men and women, this book is designed to serve as a text for students and workers in war industries. The information presented is terse and to the point, and practical considerations prevail throughout. Some of the topics treated are general factory procedures, use of common hand tools, simple mathematics, blueprint reading, lathe operation, inspection (procedures and tools used), precision instruments, cutting tools, and so on.

The book is written in an easy-to-understand manner and is illustrated throughout with photographs and drawings. An appendix of useful tables together with a handy index is included at the rear of the book.

SHOP LITERATURE

Graphite Lubrication Handbook. This 28-page booklet, issued by Nassau Laboratories, Hackensack, N. J., explains

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All sizes from 30 caliber to 4.7" brass or steel cartridge cases.

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the work which natural colloidal graphite performs and describes briefly the various standard grades of colloidal graphite marketed by the firm under the name Cograph. A price list of Cograph products is also included. In addition, the booklet contains an indexed list of applications for Cograph which the lubrication engineer should find especially helpful. Copy free upon request.

Clayton Boring Bar Holders. Designed for lathe swings from 8 to 36 inches, a line of boring bar holders with unique dual clamping arrangement is covered in a six-page illustrated folder issued by the Clayton Mfg. Co., Alhambra, Cal. The folder also includes information on Clayton Individual Boring Bars and Boring Bar Holder Sets. Copy free upon request.

Ward Leonard Vitrohm Strip Resistor. Bulletin 23 giving dimensions, ratings, ohmic values, and other information on the Ward Leonard Vitrohm Strip Resistor which is said to be especially suited for application in aviation, radio, and installations where space limita-

tions and high unit space watt ratings are important requirements is now being distributed by the Ward Leonard Electric Co., Mount Vernon, N. Y. Copy free upon request.

"The 'Know-How' of Grinding" is the title of a four-page folder now being distributed by the Norton Company, Worcester, Mass., which includes data on Norton instruction aids on grinding that are available; namely, motion pictures, training course, and informative literature. Copy free upon request.

Hilco Universal Cutter-Grinder is described and illustrated in a four-page circular released by the Berco Mfg. Co., 429 W. Superior St., Chicago, Ill. Various illustrations showing typical setups on the unit for grinding slitting saws, shell end mills, double angular cutters, spiral end mills, concave milling cutters, tapered reamers, spiral milling cutters, and so on, are also included in the circular, copy of which is available free upon request.

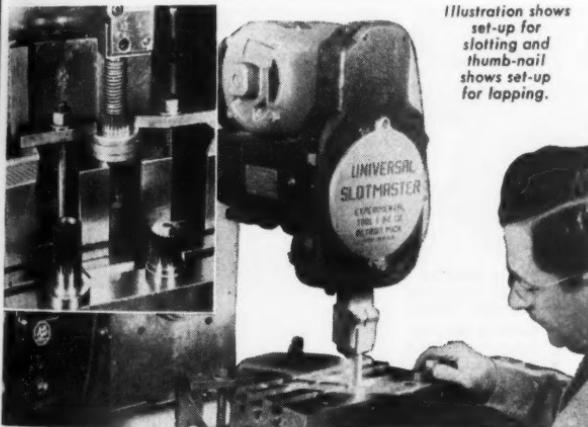


Illustration shows
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SPIRABANDS: Metalite Cloth Spiraband is a new product designed to hold abrasive cloth in place on irregular surfaces. They are made of woven metal mesh which holds the cloth in place. They may be used on irregular surfaces such as castings, forgings, and other parts which cannot be held in place by ordinary methods.

SPIRACORDS: Metalite Cloth Spiracord is a new product designed to hold abrasive cloth in place on irregular surfaces. They are made of woven metal mesh which holds the cloth in place. They may be used on irregular surfaces such as castings, forgings, and other parts which cannot be held in place by ordinary methods.

SPIRAPOLYNS: Metalite Cloth Spirapoly is a new product designed to hold abrasive cloth in place on irregular surfaces. They are made of woven metal mesh which holds the cloth in place. They may be used on irregular surfaces such as castings, forgings, and other parts which cannot be held in place by ordinary methods.

SLOTTED DISCS: Metalite Cloth Slotted Discs are made of woven metal mesh which holds the cloth in place. They are made of woven metal mesh which holds the cloth in place. They may be used on irregular surfaces such as castings, forgings, and other parts which cannot be held in place by ordinary methods.

MUSHROOM PAD AND TRUCK: Metalite Cloth Mushroom Pad and Truck are made of woven metal mesh which holds the cloth in place. They are made of woven metal mesh which holds the cloth in place. They may be used on irregular surfaces such as castings, forgings, and other parts which cannot be held in place by ordinary methods.

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"Metalite Cloth Gadgets Speed Sanding" is the title of a wall poster now being distributed by Behr-Manning, Troy, N. Y. The poster illustrates and describes Metalite Cloth Spirabands, Spirapoly, Spiracords, slotted discs, mushroom discs, and pencils. Illustrations showing applications of the various gadgets are included. Different types of mandrels for use with the slotted discs, pencils, and Spirapoly are also illustrated and described. Copy of poster free upon request.

Keystone Industrial Brush Catalog and Price List K-15. A 24-page catalog and price list on slip ring, motor and generator brushes, metal graphite and carbon products is announced by the Keystone Carbon Co., Inc., St. Marys, Pa. Copy free upon request.

Armor Universal Turret Milling Machine with hydraulic feed is the subject

of a six-page illustrated bulletin now being distributed by Aircraft Machinery Corp., Burbank, Cal. The bulletin covers in detail the features, construction, operation, uses, and specifications of the machine and treats briefly various accessories for the unit. Copy free upon request.

Hydra-Motive Infinitely Variable Delivery Hydraulic Vane Pumps is the subject of Bulletin Hy-2 now being distributed by Hydra-Motive, Inc., 253 St. Aubin Ave., Detroit, Mich. Copy free upon request.

Ideal "Thermo-Grip" Electric Soldering Sets for both small and large soldering jobs are described and illustrated in a four-page folder released by the Ideal Commutator Dresser Co., 1031 Park Ave., Sycamore, Ill. The folder also includes illustrations and descriptions of the Ideal No. 1 "Instant Heat" Electric Solderer for delicate soldering work, Ideal No. 3 "Quick Heat" Electric Soldering Iron for intermittent soldering, and new Ideal Electric Brazer for brazing and soldering with silver solder. Copy free upon request.

"**Duplicmatic Simplifies Difficult Contour Shaping Operation**" is the title of a bulletin issued by the Detroit Universal Duplicator Co., 723 E. Milwaukee Ave., Detroit, Mich., illustrating and describing how a Duplicmatic machine control used in connection with a certain make standard shaper enabled this machine to perform a high speed automatic contour shaping operation on aircraft crankshaft. Copy of Bulletin No. 5 free upon request.

Michigan Gear Finisher Bulletin No. 861-42. Of special interest to manufacturers of gears of less than 4 inches in diameter is a descriptive bulletin on the Michigan No. 861-4B Light Duty Gear Finishing Machine which is now being issued by the Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich. The bulletin, which is designated as the No. 861-42, contains information on the design and operating features of the machine, its scope, feed of operation, and so on. Specifications also included cover the range of gear sizes that can be handled, cutter sizes, drive motor data, and overall dimensions. Copy of bulletin free upon request.

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The tungsten carbide gage shown half size, is typical of special tools made to superlative accuracy by Tungsten Alloy. It is used to check the races of aircraft-engine bearings . . . is dead true on center and has a diameter tolerance of one one-hundred-thousandth of an inch. It takes good equipment and good men to do that. Why not let these machines and these craftsmen make your tools and gages?

Bulletins On Request

**TUNGSTEN ALLOY MFG. CO. • 65 COLDEN ST., NEWARK, N. J.
Formerly Circle Tip Tool Co.**

TUNGSTEN CARBIDE SPECIALISTS

"Can You Afford to Gamble with Production Delays?" is the title of a 16-page illustrated catalog issued by the Invincible Tool Co., 611 Empire Bldg., Pittsburgh, Pa., covering Invincible Angle Tool Attachments for portable drills and their application to war production work. Copy free upon request.

"Upsy" Drum-Loading Truck for handling drums, barrels, kegs, and other containers having chimes or beads is covered as to operation, construction,

specifications, and so on, in a six-page illustrated folder issued by The American Pulley Co., 4200 Wissahickon Ave., Philadelphia, Pa. Copy free upon request.

"How to Build Johansson Gage Block Combinations" is the subject of a bulletin published by the Ford Motor Co. Johansson Division, Dearborn, Mich. In addition to illustrated and descriptive information on the building of such combinations, the bulletin also includes data on the care of Johansson Gage Block and accessories. Copy free upon request.

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The World's Best Rubberized abrasives for Fine Grinding and Polishing

Attach this advertisement to your card or letterhead. We will send you a free trial sample. Or if you prefer send \$1.00 for Special 33 wheel assortment.

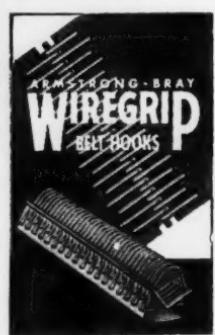
CRATEX MFG. CO. 81 Natoma Street San Francisco • Calif.



STEELGRIP BELT LACING
A strong lacing for all types of belts. Put on with a hammer in a few minutes. Clinches smoothly into belt, compresses ends, prevents fraying. 2-piece hinged rocker pins provided. 8 sizes. In boxes, handy packages, cartons and long lengths.

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"The Belt Lacing People"
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BELT LACING Both types from 1 source

BELT HOOKS come with blue aligning cards that prevent waste—every hook can be used. Protects fingers. Applied with a WIREGRIP or any other standard Belt Lacing Machine. 6 sizes.

Cincinnati 28-Inch Series Vertical Hydro-Tel Milling Machine is the subject of a 24-page catalog published by The Cincinnati Milling Machine Co., Cincinnati, Ohio. The catalog, which is designated as the M-1018-2, profusely illustrates and describes the construction, operation, application, and so on, of the machine and includes complete specifications of the unit. Copy free upon request.

Covel No. 22 Universal Cutter and Tool Grinder. A 20-page bulletin illustrating and describing features, operation, construction, application, and so on, of the Covell No. 22 Universal Cutter and Tool Grinder as well as numerous attachments for use with the machine has been published by the Covell Mfg. Co., Benton Harbor, Mich. Specifications of the grinder are also listed. Copy of Bulletin 1042 free to mechanical executives upon request.

Put Colwell
TOOL POST TURRETS
on the job...

Saves Time... Saves Money.

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25 CONGRESS AVE. PROVIDENCE, RI

in a six-page folder. The American Electric Furnace for heat treating and laboratory uses is described and illustrated in Bulletin G now available from the Thermo Electric Mfg. Co., 332 W. 69th St., Chicago, Ill., free upon request.

"Air Clean As A Whistle," a four-page booklet illustrating and describing the Precipitron Electric Air Cleaner, how it operates, how it is installed, and its application to large rotating electric machinery, is announced by the Westinghouse Electric & Mfg. Co., Edgewater Park, Cleveland, Ohio. Copy of Booklet B-8605 free upon request.

Vertical Boring Mills, the subject published by The Co., Cincinnati, which is designed to show the construction and operation, so on, of the complete specification free upon request.

Cutter and Milling Machine Bulletin illustrates, operation, and universal Control, as well as numerous features of the machine. Specifications also listed. Mechanism

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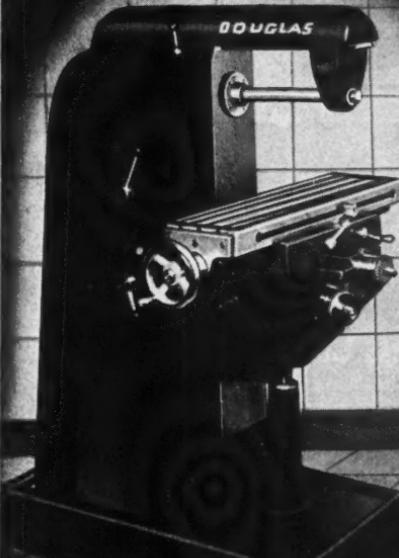
February, 1943

Erie, Pa.

Temco Electric Furnace for heat treating and laboratory uses is described and illustrated in Bulletin G now available from the Thermo Electric Mfg. Co., 332 W. 69th St., Chicago, Ill., free upon request.

"Mark Everything Permanently" is the title of a four-page folder published by the Ideal Commutator Dresser Co., 1031 Park Ave., Sycamore, Ill., covering its line of electric etchers for etching small, medium, and large work of steel, iron, or their alloys. The folder also features the Ideal Electric Marker which can be used on steel, iron, bronze, brass, aluminum, alloys, ceramics, copper, lead, plastics, bakelite, glass, hard rubber, and so on. In addition, the folder treats briefly Ideal Electric Soldering Tools and "3-in-1" Electric Cleaners. Copy free upon request.

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FOR SMALL PARTS PRODUCTION**



**WIDE RANGE OF SPINDLE SPEEDS
CENTRALIZED CONTROL**

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BY LARGE SCALE PRODUCTION**

**DOUGLAS MACHINERY CO. INC.
150 BROADWAY**

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Zagar Collet Chucking Fixtures, both straight holding and combination holding and indexing types, are illustrated and described in detail in an eight-page bulletin issued by Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland, Ohio. The bulletin includes numerous illustrations showing the fixtures in use as well as instructions for setting up and operating the fixtures. Copy free.

"On the Land, on the Sea and in the Air" is the title of a 20-page brochure released by The Fostoria Pressed Steel

**For GREATER SAFETY of Valuable Tools
Use GS DOUBLE LOCK
TOOL CHESTS**

The right type of chest for every mechanic from higher grade to more reasonably priced. Before ordering any toolchest write for our literature.



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LOOK AT THESE FEATURES

- No honing.
- Will not chatter.
- Chrome-like finish.
- Perfect alignment.
- Full bearing surface.
- Left and right spirals.
- 50 to 80 thousandths expand.
- Cannot fall in slots or oil grooves.
- Extension pilots for line-up work.

EVANS FLEXIBLE REAMER CORP.
4541 RAVENSWOOD AVE. • CHICAGO, ILL.

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Corp., Fostoria, Ohio. The brochure illustrates and describes how Fostoria Lighting and Infra-red Equipment are speeding the production of war materials used on the land, on the sea, and in the air. Copies of the brochure are available by asking for Flashes No. 1042.

"Calling All Horsepower," a 20-page booklet issued by the Westinghouse Electric & Mfg. Co., Dept. 7-N-20, East Pittsburgh, Pa., lists and discusses six recommendations for obtaining maximum production out of all motors. Accompanying charts and illustrations give specific information on pounds of critical war material saved by following each recommendation. Copy of Booklet B-3188 free upon request.

"Koven Men and Machines for War Work" is the title of a 16-page brochure issued by L. O. Koven & Brother, Inc., 154 Ogden Ave., Jersey City, N. J. Profusely illustrated throughout, this brochure presents a comprehensive outline of the facilities, experience, and trained workers offered by the company in metal fabricating for both prime and subcontract war production. Copy free.

"Secomet Diamond Wheels—How to Use Them" is the subject of a 12-page illustrated booklet published by J. K. Smit & Sons, Inc., 157 Chambers St., New York, N. Y. The booklet includes information regarding the mounting and dressing of Secomet Diamond Wheels, the use of coolants with these wheels, the speed at which the wheels should be operated, their use in performing dry, surface, and form grinding operations, and so on. Copy free to shop executives upon request.

EVANS HIGH SPEED STEEL REAMERS



LOOK AT THESE FEATURES

- No honing.
- Will not chatter.
- Chrome-like finish.
- Perfect alignment.
- Full bearing surface.
- Left and right spirals.
- 50 to 80 thousandths expand.
- Cannot fall in slots or oil grooves.
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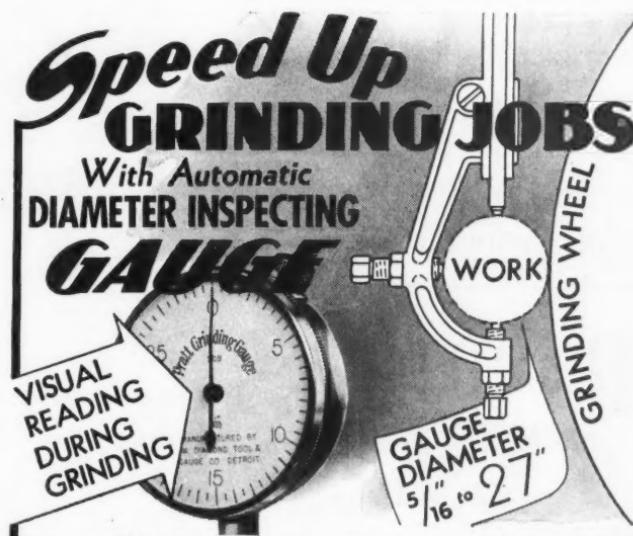
"Mountains of Metal" is the title of a four-page folder published by the Johnson Bronze Co., 590 S. Mill St., New Castle, Pa., containing illustrated, descriptive, and tabular information on Johnson Universal Bronze Bars. Copy free upon request.

FlexoID Speed Control Units. The Smith Power Transmission Co., 1545 E. 23rd St., Cleveland, Ohio, has published a folder describing various applications of its FlexoID Speed Control Units. Copy of Folder FSC No. 198 free upon request.

"A Challenge to Designers of Drive Control" is the title of a 14-page bulletin issued by Westinghouse Electric & Mfg. Co., covering a versatile d.c. drive control known as the "Rototrol." The bulletin tells how the Rototrol increases speed range, keeps the speed of a d.c. motor constant regardless of load variations, makes accurate or very close speed regulation possible, provides uniform acceleration and deceleration, maintains constant horsepower and uniform tension, and so on. Charts, diagrams, and photographs illustrate how the Rototrol regulates by transposing mechanical and electrical quantities. Typical applications of the control are also described and illustrated.

Copy of Bulletin B-3123 may be obtained from Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Visual Learning Guides. National Audio-Visual Council, Inc., 160 N. La Salle St., Chicago, Ill., has published an eight-page brochure which describes a series of Visual Learning Guides now available for use with U. S. Office of Education training films on precision measurement, the engine lathe, milling machine, vertical boring mill, shaper, radial drill, sensitive drill, vertical drill, action of single point cutting tools, and bench work. The brochure discusses how the use of Visual Learning Guides increases the effectiveness of the films, speeds progress, and so on. Copy free upon request.



Pratt Grinding Gauges caliper external cylindrical jobs while work is in motion or at rest. Adapted to straight or tapered work. Tolerances of .0001" plus or minus easily maintained. Visible check on out of roundness, rough grinding and chatter. Cannot grind work undersize unknowingly. Easily installed on any grinder. Pratt Grinding Gauges increase production, eliminate scrap and assure accuracy. A modern precision tool, ruggedly built.

Send for Bulletin

American
DIAMOND TOOL & GAUGE CO.
15928 WOODINGHAM • DETROIT, MICH.

Mills Victory Wood Partitions for offices, washrooms, and so on, are fully illustrated and described in an eight-page bulletin issued by The Mills Co., 985 Wayside Rd., Cleveland, Ohio. Copy free upon request.

Ward Leonard 4-Inch Pressed Steel Rheostats are covered in detail in a four-page bulletin released by the Ward Leonard Electric Co., Mount Vernon, N. Y. Copy of Bulletin 69 free upon request.

GEARS

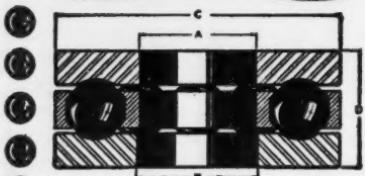
Good Gears Only

All Kinds
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BALL THRUST BEARINGS

STANDARD SIZES OR SPECIAL DESIGN to your specifications; send sketch or worn sample, regardless of condition, for quotation, without obligation. • Our complete catalog will help you in making selection of bearings—shall we send it?

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358 Furman St., Brooklyn, N. Y.

"**3-M Method of Polishing and Finishing.**" A booklet containing information on a method for grinding, finishing, and

3-M METHOD OF POLISHING AND FINISHING
using 3-M ABRASIVE BELTS AND
SEGMENT FACE CONTACT WHEELS

MINNESOTA MINING & MANUFACTURING CO.
SAINT PAUL - MINNESOTA

polishing metal by using surface coated abrasive belts and segment face contact wheels is now being distributed by Minnesota Mining & Mfg. Co., Dept. NR122, St. Paul, Minn. Copy free upon request.

G-E Fluorescent Accessories is the subject of a 16-page profusely illustrated catalog now available from the General Electric Co., Appliance and Merchandise Department, Bridgeport, Conn. The catalog includes general information on G-E Mazda F Lamp Fluorescent Starters — Glow-switch, Thermal-switch, "No Blink," and "Master No Blink" types — Fluorescent Lamp Holders and Starter Sockets. Copy free upon request.

T. H. LEWTHWAITE MACHINE CO.

PUNCHES CUTTERS
BENDERS
SPECIAL TOOLS

PUNCHES and DIES for round, square and other shaped holes.

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Aljo Hand Cut Rotary Files. An eight-page catalog describing and illustrating the complete standard line of high carbon and high speed steel hand cut rotary files marketed by the Aljo Mfg. Co., Inc., Southport, Conn., is now being issued by this firm. Copy free upon request.

Books and Films on Lathe Operation. South Bend Lathe Work; Dept. 4Z, South Bend, Ind., now has available a four-page four-color circular containing a brief description of its motion picture films, instruction books, bulletins, wall charts, and blueprints on lathe operation. The circular also offers free sample copies of several publications to those in charge of apprentice training and instruction in shop work. Copy of Circular No. 21-C free upon request.

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Copy free

Bliss, Toledo and Consolidated Horn Presses. E. W. Bliss Co., 53rd St. and 2nd Ave., Brooklyn, N. Y., is now issuing an 18-page catalog covering Bliss, Toledo, and Consolidated Horn Presses. The first part of the catalog contains illustrated, descriptive, and tabular information on the company's standard line of horn or adjustable bed presses. The latter part of the catalog includes illustrations, descriptions, and specification tables regarding heavy pattern horn presses which are built to order. Copy of Catalog No. 6 free upon request.

American Econ-O-Matic Drives is the subject of a 32-page catalog designated as the ED-42 which is now being issued by The American Pulley Co., 4200 Wissahickon Ave., Philadelphia, Pa. The catalog covers both V-belt and flat-belt drives and includes data on motor base mountings for special applications. Photographs and case histories of typical power-transmission installations are featured. Drive selection and dimension tables are additional features of the catalog, copy of which is available free to mechanical executives.

THESE ARE THE PUMPS
with inbuilt reliability
to help your machines
in round-the-clock service
Geared - Vane - Centrifugal — a wide range
of sizes for various applications.

Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.



BROWN & SHARPE PUMPS

M.S.A. "Tell-Board" Bulletin Display Cabinet

A modern bulletin display cabinet known as the M.S.A. "Tell-Board" has been announced by the Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh, Pa. The cabinet is especially designed for use in the effective and attractive displaying of war-time safety and morale posters, instructions, and special messages.

Sturdily constructed of non-critical materials, the M.S.A. Tell-Board is illuminated and is equipped with a glass



High Speed VERTICAL MILLING MACHINE and JIG BORER

with Micrometer Screw Feed
Quill

Smooth, accurate
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up to 3". Direct
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661 STATE ST. EXT.
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SAFETY BULLETINS



M.S.A. "Tell-Board" Bulletin Display Cabinet

cover on the front which, by means of a pivot joint at the top, can be swung up and away from the back of the cabinet where it is retained in an open position by a hold-out latch so that the fiber posting board can be easily removed or replaced. Tightly fitting seams are said to make the unit practical for use in exposed locations.

Attractively finished in two-tone green enamel, the M.S.A. Tell-Board Bulletin Display Cabinet measures 22 1/2 x 3 1/2 inches and is available with a glass sign with sandblasted letters reading "Safety Bulletins" or "General Bulletins."

"ALNOR" PYROMETERS

for every re-
quirement.

Inexpensive,
accurate, dur-
able.

Write for catalog.

Illinois
Testing Laboratories, Inc.
153 W. Hubbard St., Chicago



Revolvator Industrial Elevators. Designated as the No. 137, a four-page bulletin illustrating and describing Revolvator Industrial Elevators for use in lifting and piling boxes, barrels, drums, rolls, sheets, bags, crates, and so on, is now available from the Revolvator Co., North Bergen, N. J., free upon request.

Pratt Grinding Gage is the subject of a four-page catalog issued by the American Diamond Tool & Gauge Co., 15922 Woodham, Detroit, Mich. The catalog includes illustrated and descriptive information on both standard and special purpose gages and contains instructions and directions for installing and setting the Pratt Grinding Gage. Copy free upon request.

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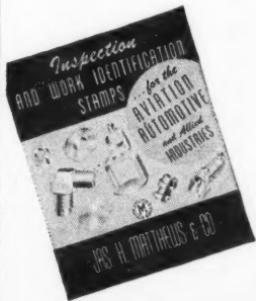
Despatch Recirculating Furnaces for heat treating ferrous and non-ferrous metals are treated in a 16-page bulletin released by the Despatch Oven Co., Minneapolis, Minn. The bulletin covers many features of the furnaces and includes suggested uses and specifications for standard and special models. High temperature heavy duty fans and indirect gas heating units as well as heating systems for gas, oil, and electricity are also illustrated and described. In addition, the bulletin contains descriptive information on ingenious material handling systems for aluminum castings. Copy of Bulletin 81 free upon request.

Westinghouse A.C. Welders. A 12-page bulletin illustrating and describing a complete line of Flexarc A.C. Welders with current ratings from 100 to 500 amperes is now being issued by the Westinghouse Electric & Mfg. Co. Featured are the 500-ampere welder for high speed continuous welding of all types of heavy construction and the 300-ampere portable heavy duty welder.

Copy of Bulletin B-3136 may be obtained free of charge from Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

ETCHING STAMPS for CODE MARKING NOW MADE IN AN *Amazing New Material*

Results of tests in actual production have shown that Matthews new "S-22" Synthetic outlasts the best rubber or other synthetic stamps from three to four times! The new "S-22" Synthetic is unaffected by acid etching inks.



The popular Peg Style illustrated is used where large volume inspection stamping of metal parts and assemblies is required.

WRITE FOR BULLETIN S-CATALOG 146
This valuable bulletin illustrates the various styles of stamps available. Write for your copy today!

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Genesee Posters on Tool Breakage. To help combat the appalling increase in tool breakage which has accompanied the introduction of vast numbers of untrained and unskilled workers into the nation's war plants, Genesee Tool Co., Fenton, Mich., has developed a series of educational posters designed to impress workers with the importance of proper tool handling and care.

Printed in three colors and measuring $2\frac{1}{2} \times 3\frac{1}{2}$ feet, the posters will be supplied without charge, primarily to users of the company's "Tomahawk" brand tools, for mounting alongside of

Vernon 7" ROTARY TABLE



MACHINERY MANUFACTURING COMPANY

Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS and
JOB BOARDS, SHAPERS and GRINDERS

Libert Hi-Speed SHEAR

■ QUICKLY TURNS UNSKILLED LABOR INTO FAST PRODUCTION WORKERS

- You can easily boost sheet metal production, even with UNSKILLED LABOR, with a LIBERT.
- Its simple operation, with Foot Pedal Control, permits fast, accurate shearing of inside or outside cuts, flat or formed pieces, plain or irregular shapes — unusual versatility easily achieved by even inexperienced workers.
- Learn how a LIBERT can save production time and labor in YOUR Sheet Metal Shearing!

Write for latest bulletins.



*Libert Hi-Speed Shear in operation at United Airlines, Inc.
LIBERT MACHINE COMPANY
Green Bay, Wisconsin
Quality Shears Since 1915

tool crib windows. A new poster will be furnished bi-monthly in order that a fresh appeal to workers may be continuously maintained.

The basic theme of each poster is the



THERE IS ONLY SO MUCH TOOL STEEL AVAILABLE

Every time a tool is broken, that tool must be replaced if production is to continue. Today, it takes as much as six months to obtain tool replacements.

phrase "There Is Just So Much Tool Steel Available." Some of the posters, however, will dramatize pictorially the possible effect of tool breakage in delaying war production. Others will bring home the value of actual tools themselves in terms of fighting equipment. In addition, some of the posters will depict in smaller insert illustrations several common faults of carelessness which lead to tool breakage.

"Ballofet Diamond Tools for Industrial Purposes" is the title of a four-page folder now being distributed by Ballofet Dies & Nozzle Co., Inc., 625 Adams St., Guttenberg, N. J. The folder includes information on diamond tools for truing and dressing abrasive wheels, shaped diamond tools, diamond points, unmounted stones, glaziers' diamonds, diamond dies, and diamond dust. Copy free upon request.

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may be con-
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American Diamond Tools. American Diamond Tool & Gauge Co., 15922 Woodingham, Detroit, Mich., now has available a six-page folder illustrating and describing several of the various industrial diamond tools it is now marketing. Copy free upon request.

"Weld Thin Metals" is the title of a 20-page bulletin issued by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., which covers in detail its Weld-O-Tron Arc Welder for use in welding various types of metals as thin as .02 gauge. Numerous applications of the welder in different industries are illustrated and described. Copy of Bulletin B6049A free upon request.

"All Machine Shops Need Diamonds," a four-page folder released by Somerset Industrial Diamond Co., 220 Virginia St., Hillside, N. J., illustrates and describes several different types of diamond tools for dressing various grinding wheels, diamond dust for lapping drill jig bushings, and diamond impregnated wheels for lapping hard metal alloys. Copy free upon request.

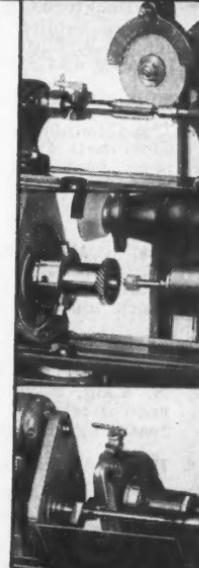
Trindl Super Industrial Welding Equipment. A series of four bulletins concerning the Trindl Super Industrial line of arc welders, welding helmets, and welding accessories, including arc torch, chipping hammer, welding gaunt-

let, welding cable, welders' clamp, welding and grinding goggles, and electrode holders, is now being issued by Trindl Products Ltd., 2227 Calumet Ave., Chicago, Ill. Copies free upon request.

Jessop C.N.S. Air-Hardening Die Steel. Complete data on Jessop C.N.S. Air-Hardening Die Steel is contained in an eight-page bulletin, designated as the 742, which is now being distributed by the Jessop Steel Co., Washington, Pa. Copy free upon request.

ROTOREX UNIVERSAL GRINDER

Designed
specially for
*The Modern
Tool Room*



DOUGLAS MACHINERY CO.

150 Broadway, New York, N. Y.



FOR YOUR CATALOG LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Cutter and Tool Grinder

New 20-page catalog featuring the Covell No. 22 Universal Cutter and Tool Grinder has been issued by Covell Manufacturing Co., Benton Harbor, Michigan.

2. Punching, Forming, Riveting Tools

Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill., has available new 48-page catalog featuring Whitney-Jenson aircraft tools for punching, forming and riveting.

3. Milling with High Speed Steel

The Cincinnati Milling Machine Co., Cincinnati, Ohio, has published a 24-page booklet titled "Milling with High Speed Steel."

4. Stamps

Jas. H. Matthews & Co., 3944 Forbes St., Pittsburgh, Pa., has available catalog 146 titled "Inspection and Work Identification Stamps."

5. Surface Plates

Square Surface Plate & Tool Co., 221 N. Main, Royal Oak, Mich., has issued illustrated folder and price list featuring surface plates.

6. Honing and Filing Tool

Portable electric honing and filing tool, reciprocating action, is detailed in catalog No. 42 available from Acme Tool Co., 200 Church St., New York, N. Y.

7. Diamond Tools

Balloffet Dies and Nozzle Co., Inc., 6825 Adams St., Guttenberg, N. J., has issued folder illustrating and describing Balloffet diamond tools for industrial uses.

8. Air Vise

Bulletin featuring the Speedy Air Vise has been issued by W. R. Brown Corp., 5720 Armitage Ave., Chicago, Illinois.

9. Special Cutting Tools

Bulletin featuring A. C. E. Special Tools manufactured to customer's blueprints is available from American Cutter and Engineering Corp., Warren, Michigan.

10. Tapping Machines

An eight-page bulletin covering its new line of tapping machines has been released by Detroit Tap and Tool Co., Detroit, Michigan.

11. Collet Chucks

Erickson Collet Chucks are illustrated and described in Bulletin D issued by Erickson Steel Co., 200 Hamilton Ave., Cleveland, Ohio.

12. Radial Drills

The American Tool Works Co., Cincinnati, Ohio, has available Bulletin No. 328 detailing American Hole Wizard Radials.

13. Rotary Tables

Eight-page catalog featuring Troyke Rotary Tables in 9-in., 12-in., 15-in. and 18-in. sizes has been issued by Alfred A. Troyke, 4422 Appleton St., Cincinnati, Ohio.

14. Toggle Clamps

De-Sta-Co Toggle Clamps are detailed in Bulletin No. 41, issued by Detroit Stamping Co., 349 Midland Ave., Detroit, Michigan.

15. Machine Tool Accessories

Ideal Commutator Dresser Co., 1031 Park Ave., Sycamore, Ill., has available catalog detailing live centers, demagnetizers, marking tools, balancing ways and other machine tool accessories.

16. Lift Trucks

The Hydroelectric motorized lift truck is illustrated and described in folder issued by Lift Trucks, Inc., 2425 Spring Grove Ave., Cincinnati, Ohio.

17. Air Motors

The construction and uses of Senacon Air Motors are described in a new bulletin offered by Smith-Johnson Corp., 623 E. 12th St., Los Angeles, California.

18. Wet-Dry Belt Surfacing

Porter-Cable Machine Co., Syracuse, N. Y., has published a 20-page catalog, giving the details on the Wet-Dry Belt Surfacing method.

19. Abrasive Cutting

Manufacturers doing production cutting of steel, brass, bronze, monel

metal, ceramics, plastics and glass will find "Abrasive Cutting" booklet helpful. Available from Andrew C. Campbell Division, American Chain & Cable Co., Bridgeport, Conn.

20. Electric Furnaces

Electric furnaces for industrial and laboratory uses are detailed in folder released by Cooley Electric Manufacturing Corp., Indianapolis, Indiana.

21. Correct Drill Pointing

Booklet titled "Correct Drill Pointing" will help conserve cutting tools. Available from Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago, Illinois.

22. Decimal Equivalents Charts

John Hassall, Inc., 394 Oakland St., Brooklyn, N. Y., has available Decimal Equivalents Chart.

23. Leveling Jacks

Empco Leveling Jacks are illustrated and described in literature available from The Enterprise Machine Parts Corp., 2733 Jerome Ave., Detroit, Michigan.

Print plainly in filling out coupon for literature.

MODERN MACHINE SHOP

431 Main Street, Cincinnati, Ohio

I am interested in receiving the following literature reviewed in your February issue.

No. No. No. No. No.
(Insert numbers denoting literature you want.)

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Center Scope. A 16-page booklet describing methods of optical locating and centering with the Center Scope has been released by the Center Scope Instrument Co., 361 S. La Brea Ave., Los Angeles, Cal. Complete with case histories and application pictures, the booklet discusses in detail the story of optics and how optics are used by the Center Scope, and describes and illustrates how accuracy is obtained with this instrument. Copy free upon request.

SR-4 Strain Gage and Accessories. Three technical bulletins, one describing the company's SR-4 Strain Gage and the other two, recording and indicating instruments for use with SR-4 Strain Gages, have been issued by the Baldwin Southwark Division of The Baldwin Locomotive Works, Philadelphia, Pa. The bulletin on the SR-4 Strain Gage includes detailed descriptions of the three standard gages available, information on their application in measuring and recording dynamic and semi-dynamic strains, and instructions for installing the gages on structures to be analyzed. The other two

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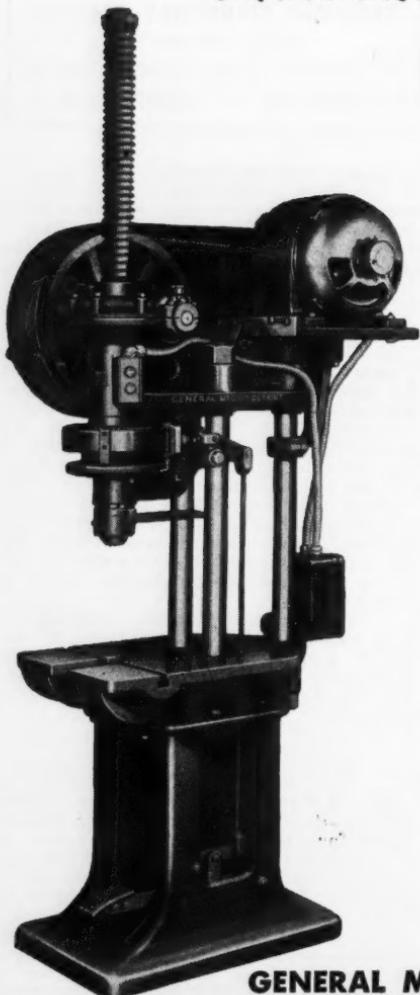
bulletins contain detailed descriptions of the SR-4 Strain Recorder and SR-4 Portable Strain Indicator together with data on their use with SR-4 Strain Gages. Copy of all three bulletins free upon request.

New Production Equipment Section for Sweet's Catalog File for Mechanical Executives, 1942. Sweet's Catalog Service, 119 W. 40th St., New York, N. Y., announces that it now has available a new Production Equipment for its catalog file for mechanical executives. The section includes catalogs from 110 companies and consists of 820 pages, thus making it considerably larger than the previous section which consisted of 170 pages and included catalogs from 20 companies.

A thousand copies of this new section are available for distribution to selected plants in which production is principally metal fabricating, machinery, automobile, and aviation manufacturing.

Farrel Type TT Roll Grinder. Operating and engineering executives responsible for the accuracy and finish of ground rolls, cylinders, and shafts are said to find considerable information of practical value in a comprehensive 32-page bulletin issued by the Farrel-Birmingham Co., Inc., Ansonia, Conn. The bulletin describes the advanced design, construction and operating features of the Farrel Type TT Roll Grinder with moving work table. In addition, the bulletin conveniently tabulates specifications, dimensions, and weights of each of the three different sizes in which the machine is available. Standard equipment and optional attachments are described and electrical requirements given. Numerous photographs, diagrams, and drawings illustrate the features of the machine. Copy of Bulletin No. 113 free upon request.

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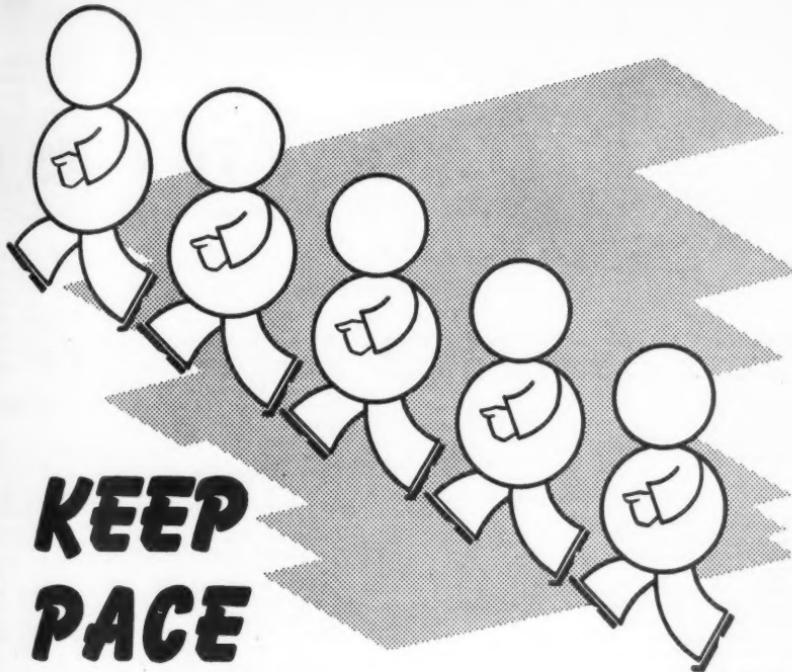
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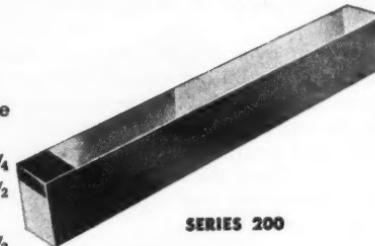


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The Last Word . . .

THE prospector is taking to the hills again—but he's a different fellow from the hardy soul who pushed civilization westward about the time of the Civil War. Today's prospector is searching for metals more precious than gold; he knows—and the people of the West know—that vast mineral resources must be brought into full production to supply our war needs.

Steel, aluminum, chromium, magnesium, tungsten, and scores of other strategic metals are needed for the manufacture of tools of war in unheard-of quantities. We need more than 100,000,000 tons of steel a year; we need over 2,000,000 tons of copper; we need about twenty times as much magnesium as we produced in 1940.

One of the wonders of today is the new "mining" of magnesium. Believe it or not, down in Texas ordinary sea water is pumped from the ground and the mineral salts always present in the water are extracted to make magnesium. Texas produced over 50,000,000 pounds in 1942, compared with a total U. S. production of only 6,000,000 pounds in 1938.

Manganese, to the war-time prospector, is much more valuable than gold. A certain amount of manganese is needed in every one of the hundred million tons of steel we will make this year. We used to import most of our manganese, but the U. S. Bureau of Mines and the Geological Survey have now developed methods of using low grade ores which previously had seemed of little value. As a result, ten projects are under way in the West to produce manganese, and an annual production of over 600,000 tons of high grade manganese seems probable.

Before the war we imported over 10,000 tons of tungsten from China and other foreign sources annually, while we produced about 5,000 tons. After Japan upset our tungsten cart, we started developing our own tungsten resources and we will soon be independent of foreign sources of supply.

Chromium, used in previous years to brighten automobiles, lipstick cases, cigarette cases, and countless other items, was the treasure of the gadgeteer. But chromium has a dual character, and it is the more practical side that is of vital importance to our war effort.

Armor plate cannot be made without chromium; stainless steel is 15 per cent chromium; engine parts, tool steel, and a host of war products depend upon chromium as a necessary alloy. This country has never produced enough chromite (the ore) to meet our needs, but here again the West, with its new scientific prospecting, is saving the day for America.

Three very important chromite deposits have been discovered in Montana and are being developed. In one 30-mile strip through the mountains enough ore has been located to produce well over 200 tons a day, or 600,000 tons a year. The ore is low grade and expensive to refine, but in the present emergency cost is secondary consideration. The war must be won.

In peace time mining is a fairly big business. Most smelters will not deal in less than carloads of ore. But now, with the pressure on for strategic materials, the West is setting up buying stations at convenient locations to permit owners of small deposits to convert them into cash and at the same time contribute to winning the war. From the tiniest mining camps of the West metals are fed into the arsenals from which is coming the flood of fighting materials and equipment that will enable us to beat the Axis.

The prospector is taking to the trails again with a new purpose; to find materials that will enable us to guard successfully our most valuable treasure—our liberty.

Howard Campbell